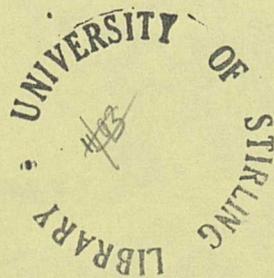


CHAPTER 9



9 TO WHAT EXTENT TO THE NINE PARTICIPATING UNIVERSITIES PROVIDE GUIDANCE AND HELP FOR THOSE ACADEMICS WHO WISH TO ASSUME RESPONSIBILITY FOR EXPLOITING THEIR DISCOVERIES?

9.1 Introduction

Sir Keith Joseph's statement of 14 May, 1985 not only expressed the wish that UK universities encourage researchers to assume responsibility for exploiting their discoveries; it also asked universities to "*provide guidance and help*" for those who wish to do so. Yet again, the document made no attempt to define what the DES understood by "*guidance and help*", though in the preceding paragraph it referred to the need for adequate arrangements and procedures for identifying potentially exploitable results and two paragraphs later it mentioned the need to maximise the possibility that good inventions will be identified, assessed, protected and exploited. Paragraph 2 of the Kingman letter - which accompanied the DES statement - reiterated and expanded upon this in four out of eleven numbered points. These indicated that universities should address the following matters.

- (i) identification of discoveries and know-how;**
- (ii) assessment of potential for exploitation;**
- (iii) protection of IP; relationship to publication;**
- (iv) sources of finance, marketing, negotiation *etc*;**
- (vii) providing, or buying expertise.**

Once again, in order to establish the extent to which the participating universities provide guidance and help, we need to employ objective measures. It was felt that, in the absence of a DES/ESG definition of "*guidance and help*", these statements indicated the direction of the two groups' thinking and provided a basis for arriving at an appropriate definition and constructing appropriate objective measures.

(i) Guidance

For the purposes of this study, "*guidance*" was interpreted as meaning "how to do" - or how to go about - the various procedures entailed in the process of identifying, evaluating, protecting and exploiting IP. These include, for instance:

- * understanding the importance of identifying potentially exploitable IP and notifying the university before disclosing research findings,
- * how to evaluate the potential of IP, once identified,
- * how to protect such IP,
- * how to do market research;
- * how to locate potential licensees/assignees,
- * how to approach potential licensees/assignees;
- * how to negotiate with potential licensees/assignees,
- * how to draft agreements;
- * how to negotiate with licensors/assigners.
- * how to write business plans,
- * how to locate venture capitalists;
- * how to locate suitable start-up premises,
- * how to obtain advice on other aspects of business start-up

This is not intended to be an exhaustive list, but to cover the procedures most commonly involved. These are, of course, procedures which universities themselves may need to carry out, in the event that a researcher has no interest in assuming responsibility for the exploitation of his IP. Universities might acquire the necessary skills themselves by training one or more existing members of staff, by appointing one or more new members of staff who already have some/all of the requisite skills, or by identifying and drawing

upon on the reservoir of skills which exist within the academic community itself.

Alternatively, they could access the necessary skills indirectly, by developing contacts with local or national providers to whom they can refer, *gratis* or for a fee

The above list provides the basis for the following 12 measures

- (a) is the academic community told about the importance of identifying potentially exploitable IP and notifying the university before disclosing research findings?
- (b) are academics told how to evaluate the potential of their IP?
- (c) are academics told how to go about protecting their IP?
- (d) are academics told how to locate potential licensees/assignees?
- (e) are academics told how to approach potential licensees/assignees?
- (f) are academics told how to negotiate with potential licensees/assignees?
- (g) are academics shown how to draft agreements?
- (h) are academics told how to negotiate with licensors/assignors?
- (j) are academics taught how to write business plans?
- (k) are academics introduced to venture capital providers?
- (l) are academics told where they might locate start-up premises?
- (m) are academics given guidance on other aspects of business start-up?

(ii) Help

For the purposes of this study, "*help*" was interpreted as meaning the provision or partial provision of those tangible and intangible resources associated with the process of identifying, evaluating, protecting and exploiting IP. Broadly, these include.

- * **funding (to cover the cost of evaluation, patenting, start-up capital *etc*),**
- * **other tangible resources (use of equipment, instrumentation, support staff, communications, accommodation *etc*);**
- * **intangible resources (time in which to contribute to the process of evaluating IP, protecting it, seeking licensees/assignees, founding/co-founding a company)**

Again, this is not intended to be an exhaustive list, but to cover the most commonly required resources. Many of these are resources which universities may need to provide, even if a researcher has no interest in assuming responsibility for the exploitation of his IP.

The above list provides the basis for the following 8 measures

- (n) does the university fund the cost of a patent agent?**
- (p) does the university pay for expert and independent evaluation of potentially exploitable IP?**
- (q) does the university pay the cost of acquiring patents/registered designs?**
- (r) does the university temporarily free academics from their primary commitments to allow them to contribute to the process of evaluating and protecting their IP and locating licensees/assignees?**
- (s) does the university temporarily free academics from their primary commitments to allow them to become involved in university companies/joint ventures/independent spin-off companies, and if so, on what basis?**

- (t) does the university provide financial help for academics who try to exploit their research discoveries; if so, on what basis?**
- (u) does the university permit university companies/joint ventures/independent spin-off companies to use university resources, and if so, on what basis?**

In recognition of the fact that universities might provide other forms of "*guidance and help*", the final measure is

- (v) does the university provide any other form of guidance or help in relation to the process of identifying, evaluating, protecting and exploiting IP?**

This yields at least 20 measures of the extent to which the participating universities provide guidance and help to academics who wish to assume responsibility for the exploitation of their research discoveries

Section 9.2 will focus on guidance. It will outline the subsidiary questions which it is appropriate to ask in relation to measures (a)-(m) - and indicate the rationale for asking them. It will present fieldwork findings in relation to each measure - in tabular form, where possible. It will then evaluate the nine universities' performance against each of the twelve measures - by employing, where possible, an objective scoring system - or rather, a series of objective scoring systems. It will outline the basis and rationale for each scoring system and calculate each university's score for each measure. Where appropriate, it will aggregate multiple scores for any given measure to create an indicator of the extent to which each university provides the guidance in question

Section 9 3 will summarise the information given in section 9.2, it will aggregate all the scores allocated to each university and rank them according to the extent to which they have given guidance to researchers who wish to assume responsibility for the exploitation of their discoveries, as defined and measured by this study.

Section 9 4 will focus on help, it will do so in exactly the same manner as section 9 2 focussed on guidance Section 9.5 will summarise the information given in section 9 4.

While sections 9.2-9 5 concentrate on the facts of a given situation, section 9 6 will attempt to explore the processes which led to that state of affairs. It will deal first with the guidance provided by each university and then with the help which each provides. It consider whether there could be a connection between each university's rank order position (determined by the score/aggregate score for individual measures) and university type or objective factors such as university size, size of the science base, the severity of the cuts imposed by the UGC in the early 1980s *etc etc* - or whether a university's rank order position is the result of idiosyncratic attitudes or circumstances - or a combination of the two.

9.2 Guidance: Findings and Evaluation

(a) is the academic community told about the importance of identifying potentially exploitable IP and notifying the university before disclosing research findings?

Given the ratio of officers with responsibility for IP to the ratio of academics in each of the participating universities, every one of them is forced to rely heavily on academics themselves identifying potentially exploitable discoveries and coming forward to notify the university. In this situation, it is crucially important that the academic community

understands - as a general principle - the importance of doing this before disclosing their research findings to anyone outside the university in any way. It is obviously not sufficient to explain this for the first time to individual academics who come forward and notify the university about a particular discovery; by then, it may be too late. Disseminating this information as widely as possible throughout the academic community is particularly important in universities which separate responsibility for research grants from responsibility for research contracts; in this situation, the policy-implementer may have no knowledge of academics who have become grant-holders, so that he/she cannot readily take the precaution of communicating this information specifically to those academics submitting research proposals and/or those whose proposals attract funding.

There are several subsidiary questions to consider in relation to measure (a). The first concerns the targets of policy-implementers' efforts to disseminate this information. The reason for distinguishing different targets is that some academics may respond better to information which they perceive to be relevant to their particular situation - *eg.* in their role as HoD or principal investigator or research group leader - than to information which they perceive to be comparatively general and possibly "low-level". Similarly, junior staff may find it easier to justify attendance at an event which is targetted at their department or their subject area, than a general, university-wide event. The second question concerns the contexts in which this information is disseminated. Targetting on different audiences in a variety of contexts also means it is possible to deliver the same message in a number of different guises, with less fear that people will dismiss it on the grounds that they have heard/read it all before. The third question concerns the media employed to impart this information. Hard-pressed academics may not feel they have the time to read something which is not immediately relevant to their situation, presenting the information verbally in the context of a meeting which they have to attend for other reasons offers a way of

getting the message across, nonetheless. However, reliance on verbal media alone runs the risk of academics acting upon wrongly-remembered information; providing dedicated, written follow-up information offers a possible means of overcoming that problem - though people could mislay it or bin it; providing ongoing written information in a reference source such as the staff/research handbook offers a more foolproof way of overcoming that problem. The fourth question concerns the agent, that is to say, who delivers the message about the importance of notifying the university about potentially exploitable discoveries before disclosing them - someone from within the university or an outside agent. Varying the source of the information has the advantage of introducing different presentation styles - particularly if it is the policy-maker alone who delivers this message from within the university, it may also help overcome attitude problems - both on the part of the messenger ⁽¹⁾ and the audience; outside agents may have more extensive knowledge of the consequences of premature disclosure, too. The last question concerns the timing of these messages. Given the constant turnover of staff - particularly staff on research grades, and given that the commercial exploitation of IP is not a university's primary objective ⁽²⁾ and therefore not at the forefront of everyone's mind, it is not sufficient to impart this information once every few years; this should be treated as a regular and on-going exercise.

Figures 42-43 summarise the written and verbal methods which the nine participating universities used to alert their respective academic communities to the importance of identifying potentially exploitable IP and notifying the university before disclosing their findings.

The scoring systems devised in respect of measure (a) took account of these five subsidiary questions. First, these nine universities' performance was evaluated in terms of

targets; each year since it was authorised, each university was expected to have targeted at least one cross-section of the academic community (*eg.* HoDs/ Research Committee members/research group leaders) and at least one vertical section (*eg.* members of certain faculties/departments/subject areas), as well as the academic community as a whole. Second, these universities' performance was evaluated in terms of the **media** used to disseminate warnings about the implications of prematurely disclosing research discoveries; each year since it was authorised, each university was expected to have used verbal and written media and, more specifically, to have disseminated its warnings in writing both in the form of ongoing and "trigger" information. Third, these universities' performance was evaluated in terms of the **contexts** in which the information was disseminated; each year since it was authorised, each university was expected to have disseminated this information in at least one non-IP-specific context. Finally, their performance was evaluated in terms of the **agents** employed to deliver the message, universities were expected to have used at least one external agent per year since they were authorised. It should be clear that each one of these scoring systems takes account of **timing**, too.

Notes ⁽³⁾⁻⁽⁶⁾ outline the scoring systems employed; Evaluations 9.1-9.4 show the scores achieved by the participating universities

EVALUATION 9.1: SCORE FOR TARGETTING INFORMATION ABOUT THE IMPLICATIONS OF PREMATURE DISCLOSURE OF RESEARCH DISCOVERIES

<u>University</u>	<u>Uni-Wide</u>		<u>X-Section</u>		<u>Y-Section</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	2	40	1	20	5	100
City	1	50	0	0	0	0
Durham	0	0	13	260	0	0
Glasgow	0	0	8	160	4	80
Hull	2	40	5	100	0	0
Kent	3	60	0	0	0	0
Liverpool	1	20	8	160	5	100
Strathclyde	5	100	11	220	3	60
York	3	75	4	100	0	0

EVALUATION 9.2: SCORE FOR THE CONTEXTS EMPLOYED TO DISSEMINATE INFORMATION ABOUT THE IMPLICATIONS OF PREMATURE DISCLOSURE OF RESEARCH DISCOVERIES

<u>University</u>	<u>Non-IP-Specific</u>		<u>IP-Specific</u>	<u>Score</u>		<u>%</u>	
	<u>Score</u>	<u>%</u>		<u>Score</u>	<u>%</u>		
Bristol	1	20		7	70		
City	0	0		1	20		
Durham	4	80		9	90		
Glasgow	2	40		10	100		
Hull	0	0		7	70		
Kent	2	40		1	10		
Liverpool	4	80		10	100		
Strathclyde	5	100		14	140		
York	1	25		6	75		

EVALUATION 9.3: SCORE FOR THE MEDIA EMPLOYED TO DISSEMINATE INFORMATION ABOUT THE IMPLICATIONS OF PREMATURE DISCLOSURE OF RESEARCH DISCOVERIES

<u>University</u>	<u>Verbal</u>		<u>Written/Trigger</u>		<u>Written/Ongoing</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	7	140	1	20	0	0
City	0	0	1	50	0	0
Durham	9	180	4	80	0	0
Glasgow	11	220	1	20	0	0
Hull	7	140	0	0	0	0
Kent	1	20	1	20	1	20
Liverpool	14	280	0	0	0	0
Strathclyde	14	280	0	0	5	100
York	5	125	2	50	0	0

EVALUATION 9.4: SCORE FOR THE AGENTS USED TO DISSEMINATE INFORMATION ABOUT THE IMPLICATIONS OF PREMATURE DISCLOSURE OF RESEARCH DISCOVERIES

<u>University</u>	<u>Internal</u>		<u>External</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	6	60	2	40
City	1	25	0	0
Durham	8	80	5	100
Glasgow	6	60	6	120
Hull	6	60	1	20
Kent	2	20	1	20
Liverpool	8	80	6	120
Strathclyde	14	140	5	100
York	7	88	0	0

If we aggregate each university's percentage scores to create a composite indicator of guidance in relation to communicating to the academic community the importance of notifying a designated officer about potentially exploitable IP before disclosing research findings, we see that in the period since being authorised by the Research Councils only one, Strathclyde, performed better than the minimum laid down for the purposes of this study, though Liverpool came very close to that minimum:

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Strathclyde	24	(1240/1000)
2	Liverpool	94	(940/1000)
3	Durham	87	(870/1000)
4	Glasgow	78	(780/1000)
5	York	54	(538/1000)
6	Bristol	51	(510/1000)
7	Hull	43	(430/1000)
8	Kent	21	(210/1000)
9	City	15	(145/1000)

City's position at the bottom of this rank order may well be inappropriate, it should be remembered that the data for City are incomplete. However, Figures 42-43 demonstrate that most of the participating universities have devoted greater efforts - or some effort,

following a period in which they devoted no effort at all - to disseminating this information in 1989 and 1990, even though they were authorised by the Research Councils in 1986 or 1987. This is even the case where **Strathclyde** is concerned; **Strathclyde** owes its > 1000 score to a torrent of activity from 1988 onwards, after a couple of years when it did relatively little to disseminate this information. If this delayed response is a common phenomenon, the missing data might make no difference to **City's** position in this rank order.

The scores achieved by the participating universities strongly suggest that none of them have thought very analytically about how they communicate this information to the academic community. They also indicate that universities tend to get stuck in one "mind-set", using the same one or two tactics year after year. For instance, **Durham** always targets a cross-section of the academic community, whereas **Kent's** limited efforts to date have all been targetted university-wide. Only **Bristol**, **Liverpool** and **Strathclyde** have targetted a cross-section, a vertical section and the whole academic community, but **Bristol** has not done so consistently and **Liverpool** and **Strathclyde** exhibit a strong bias in favour of targetting a cross-section of the academic community at the expense of targetting the whole academic community/a vertical section respectively.

We find examples of this same "mind-set" when it comes to the media which these universities use to disseminate this information. For instance, **Hull** and **Liverpool** have used only one medium - verbal - and used it extensively. Only **Kent** has used all three media, but very sporadically. Most of the participating universities have used only two of these media - verbal and one form of written information, usually "trigger" information; with the exception of **Strathclyde**, they do not seem to have appreciated the value of ongoing written information to inform academics about the importance of notifying a

designated officer before disclosing potentially exploitable research findings.

This "mind-set" is not quite so evident when it comes to the contexts in which these universities disseminate this information; most of the participating universities have used non-IP-specific contexts as well as IP-specific contexts. However, all nine have put considerably more effort into disseminating this information in IP-specific contexts

Nor is this "mind-set" quite so evident when it comes to the agents employed to deliver this message. Every university except City and York has used both internal and external agents. However, Kent is the only university not to exhibit bias in this respect, in so far as it is fair to judge from Kent's lamentable efforts to date. Three of the other six universities exhibit bias in favour of external agents delivering this message, three exhibit bias in favour of internal agents. As Figures 42-43 reveal, in most of these universities, there is little or no variation in either the internal or the external agents employed, which almost defeats the purpose of using both internal and external agents, as defined for the purpose of this study.

(b) are academics told how to evaluate the potential of their IP?

Any discovery which is believed to have potential for exploitation needs to be evaluated in a number of different ways. These include a scientific evaluation, which seeks to ascertain whether the discovery is "good science", a technical evaluation, which seeks to ensure that the discovery conforms to the criteria laid down by UK intellectual property law and can therefore be formally protected by that law, and a market evaluation, which seeks to discover whether it is worth protecting that discovery, even if it is deemed to be good science and patentable/copyrightable *etc.* The doubt surrounding the University of Utah's claims in respect of cold fusion illustrates the reason for checking whether a discovery is

"good science". The high proportion of patent applications rejected on the grounds that they are not novel or non-obvious illustrates the reason for undertaking a technical evaluation. The extremely high proportion of patented discoveries which remain unexploited ⁽⁷⁾ illustrates the reason for obtaining a market evaluation. Some of these discoveries remain unexploited because they are "before their time", because society cannot yet see their value; (*eg* xerography), others remain unexploited because they are more expensive to manufacture than similar, less sophisticated products (*eg*. the better mousetrap ⁽⁸⁾); others again remain unexploited because organisations are resistant to change *etc etc*. If the inventors concerned had known this, they might have felt that formally protecting their IP was not worthwhile - or they might have been able to adjust their expectations in relation to the return which they expected their IP to yield.

There are three subsidiary questions to consider in relation to measure (b). The first concerns whether or not policy-implementers themselves grasp in principle why it is appropriate to evaluate a discovery in terms of these three criteria. The second concerns whether or not individual policy-implementers communicate their understanding, such as it is, to academics with potentially exploitable IP. The third concerns whether or not academics get to put their new-found understanding of the principles into practice.

Figure 44 summarises the grasp which policy-implementers in the nine participating have of the principles of evaluating potentially exploitable IP, Figure 45 shows whether or not these policy-implementers communicate their understanding, such as it is, to academics with potentially exploitable IP, Figure 46 indicates whether or not academics undertake these various forms of evaluation themselves in the nine participating universities.

The scoring systems devised in respect of measure (b) took account of these three subsidiary questions. They also took account of timing; universities were expected to explain to academics how to evaluate their IP from the year that they were authorised by the Research Councils Notes ⁽⁹⁾⁻⁽¹¹⁾ outline the scoring systems employed, Evaluations 9.5-9.7 show the scores achieved by the participating universities.

EVALUATION 9.5: SCORE FOR POLICY-IMPLEMENTERS' GRASP OF THE PRINCIPLES OF EVALUATING IP

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	12	80
City	6	100
Durham	10	67
Glasgow	15	100
Hull	10	67
Kent	6	40
Liverpool	10	67
Strathclyde	15	100
York	6	50

EVALUATION 9.6: SCORE FOR GUIDANCE IN RELATION TO THE PRINCIPLES OF EVALUATING IP

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	12	100
City	6	100
Durham	10	100
Glasgow	10	67
Hull	10	100
Kent	6	100
Liverpool	10	100
Strathclyde	10	67
York	6	100

EVALUATION 9.7: SCORE FOR ALLOWING ACADEMICS THEMSELVES TO UNDERTAKE THE VARIOUS EVALUATION TECHNIQUES

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	0	0
City	3	50
Durham	2.5	25
Glasgow	2.5	25
Hull	2.5	25
Kent	1.5	25
Liverpool	2.5	25
Strathclyde	5	50
York	1	17

If we aggregate each university's percentage scores to create a composite indicator of guidance in relation to showing academics how to go about evaluating their IP, we obtain the following, descending rank order.

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	City	83	(250/300)
2	Strathclyde	72	(217/300)
3	Durham, Glasgow, Hull, Liverpool	64	(192/300)
7	Bristol	60	(180/300)
8	York	56	(167/300)
9	Kent	55	(165/300)

The nine exhibit a great deal less variation in relation to measure (b) than they did in relation to measure (a): This is because policy-implementers have a uniform grasp of the need for a technical and market evaluation of IP, a grasp which they uniformly communicate to academics with potentially exploitable IP. They also seem to adopt a fairly uniform approach to the prospect of academics themselves undertaking these forms of evaluation. Academics themselves do not undertake a technical evaluation of their IP in any of the participating universities; policy-implementers do not seem to explain how to use the search and advisory services of the Patent Office to check on prior art relative to their particular discovery ⁽¹²⁾. City, Durham and occasionally York prefer to delegate

responsibility for this to the same organisation from which they obtain a market evaluation, whereas the other five generally delegate this to a patent agent. Nor do academics seem to undertake a market evaluation in eight of the participating universities; the only exception is Strathclyde. In every other university except Bristol this is delegated to an outside organisation; the academic concerned may have some say in the choice of organisation, though the range of options will depend on a number of factors, from financial considerations to the policy-implementer's own predilections.

Almost all the variation in these universities' percentage scores is accounted for by differences in policy-implementers' approach to scientifically evaluating IP: only Bristol, City, Glasgow, Strathclyde and York seem to grasp the need for this but only Bristol, City and York communicate this to academics with potentially exploitable IP; only City lets the academics themselves assume responsibility for the scientific evaluation. The remaining variation is occasioned by timing. Bristol and York have not provided such information as they now do since the university was authorised by the Research Councils; Kent no longer provides information to the extent that it used to

(c) are academics told how to go about protecting their IP?

There are three subsidiary questions to consider in relation to measure (c). The first concerns whether or not academics are told that IP law distinguishes different types of IP, a distinction which leads to them being formally protected in different ways (patent/copyright/design *etc*). This would also entail explaining that certain kinds of IP can be protected either formally or informally (inventions can be protected by means of a patent or by treating them as secret know-how, designs can be protected by registered design or by design right). The second concerns the actual procedures and costs involved. This would entail, for instance, explaining to academics the significance of initial patent

registrations and "A" and "B" publications, explaining the time-scales involved, the relative merits of acquiring individual national patents as opposed to the European Patent Convention or the Patent Co-operation Treaty - and the relative costs. The third concerns the conventions of drafting patent or design specifications. This would entail, for instance, giving academics guidance on the structure of patent specifications and on the breadth of their claims.

Figure 47 shows whether the participating universities provide information on the different types of IP protection, **Figure 48** indicates whether they provide information on the procedures and costs entailed in these different types of IP protection, **Figure 49** shows whether they provide information on the conventions of drafting patent/design specifications

The scoring systems devised in respect of measure (c) took account of these three subsidiary questions, they also took account of timing - *ie.* whether the relevant information has been communicated to academics ever since the university was authorised by the Research Councils or whether this form of guidance is a more recent phenomenon - or, indeed, a defunct phenomenon. Notes ⁽¹³⁾-(15) outline the scoring systems employed, **Evaluations 9.8-9.10** show the scores achieved by the participating universities

EVALUATION 9.8: SCORE FOR GUIDANCE IN RELATION TO THE DIFFERENT TYPES OF IP AND HOW EACH MAY BE PROTECTED

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	4	80
City	2	100
Durham	5	100
Glasgow	5	100
Hull	5	100
Kent	4	80
Liverpool	5	100
Strathclyde	5	100
York	4	100

EVALUATION 9.9: SCORE FOR GUIDANCE IN RELATION TO THE PROCEDURES AND COSTS ENTAILED IN ENTAILED IN DIFFERENT TYPES OF IP PROTECTION

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	4	80
City	2	100
Durham	2.5	50
Glasgow	5	100
Hull	5	100
Kent	3	60
Liverpool	5	100
Strathclyde	5	100
York	4	100

EVALUATION 9.10: SCORE FOR GUIDANCE IN RELATION TO THE CONVENTIONS OF DRAFTING PATENT/DESIGN SPECIFICATIONS

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	0	0
City	0	0
Durham	5	100
Glasgow	0	0
Hull	0	0
Kent	0	0
Liverpool	0	0
Strathclyde	5	100
York	0	0

If we aggregate each university's percentage scores to create a composite indicator of guidance in relation to showing academics how to set about protecting their IP, we obtain the following, descending rank order:

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Strathclyde	100	(300/300)
2	Durham	83	(250/300)
3	City, Glasgow, Hull, Liverpool, York	67	(200/300)
8	Bristol	53	(160/300)
9	Kent	40	(120/300)

In fact, policy-implementers in the nine universities adopt a uniform approach to the question of providing information on the different types of IP protection - even though one suspects that the actual guidance given is considerably more rudimentary in some universities than others, some of the variation is due to the fact that **Bristol** and **Kent** do not seem to have provided guidance in this respect every year since the university was authorised. Timing also explains at least part of the variation in the provision of information about the procedures and costs entailed in the different forms of IP protection. However, timing does not explain the tremendous variation in the provision of information about the conventions of drafting patent/design specifications. The reason for this will be outlined in section 9.4, when considering measure (n).

(d) are academics told how to locate potential licensees/assignees?

It will be clear from chapter 7 that most of the participating universities rely on researchers to provide at least the initial "pool" of candidate companies to approach with a view to licensing/assigning rights to their IP. In the event that researchers know of no such candidates, or the initial "pool" of candidates has not yielded an agreement, it may be necessary to use other techniques to locate potential licensees/assignees. Many

academics may have little or no knowledge - in practice or principle - of techniques which might usefully be employed. They may not be able to continue assuming responsibility for this stage of the exploitation process unless they gain this knowledge.

There are two subsidiary questions to consider in relation to measure (d). The first concerns the extent of individual policy-implementers' own knowledge and experience of techniques; there is no obvious limit to the number of techniques which could be used to locate potential licensees/assignees, but individual policy-implementers inevitably use only a limited sub-set. The second concerns whether or not individual policy-implementers are prepared to impart their knowledge of possible techniques, such as it is, to academics who have not managed to locate a licensee/assignee on their own initiative.

In relation to the first question, policy-implementers were asked which of 20 specified techniques they had used/considered using to date to locate potential licensees/assignees; 19 of these were proactive techniques, whereas one was a purely reactive technique ⁽¹⁶⁾; they were also asked whether they used any other techniques. Figure 50 shows which techniques policy-implementers in the nine participating universities reported having used/having considered using. It should be noted that the data relate to the activities of Kent's penultimate policy-implementer, it is not clear which techniques Kent's current policy-implementer plans to use, other than contacting the BTG or following up academics' own suggestions. Figure 50 also distinguishes those techniques regarded by each policy-implementer as the most productive and therefore the most commonly employed, conversely, it distinguishes those techniques employed the least frequently and those not employed at all by each policy-implementer.

In relation to the second question, the impression was gained that policy-implementers at **City and Strathclyde** certainly do impart their knowledge of appropriate techniques, such as it is, to academics who have been unable to locate potential licensees/assignees on their own initiative. It seems likely that policy-implementers at **Glasgow, Hull and Liverpool** do likewise, as did **Kent's** former policy-implementer. It is not clear whether this happens at **Bristol, Durham or York**, though. Unfortunately, it proved impossible to substantiate these impressions with hard, objective data. As a result, we can do no more than use the information detailed in **Figure 50** as a basis on which to evaluate the potential for policy-implementers in the nine participating universities to impart to their knowledge of these techniques to academics who wish to assume responsibility for this part of the exploitation procedure.

The evaluation focussed first on the number of techniques which policy-implementers reported having used/considered using to date, it was felt that although it might never be necessary to use all 19 proactive techniques in practice, preparedness in principle to use a wide range of techniques could be taken as indicating greater tenacity when it comes to locating potential licensees/assignees. Next, it focussed on the character of the techniques which policy-implementers reported having employed/considered employing; six of the techniques listed would almost certainly be new to most academics - in practice and possibly in principle, too, whereas nine may be known to some academics already and four would almost certainly be familiar to most academics in science and technology disciplines. It was the aim of the evaluation to assess whether the techniques which each policy-implementer reported having used/considered using are predominantly novel or whether they direct academics to draw predominantly on sources of information already known to them, in practice or in principle. The evaluation should have focussed, finally, on timing, that is to say, it should have assessed whether or not each university has

communicated information on these techniques - or at least had the potential to do so - from the year in which it was authorised by the Research Councils to the present day It is clear that, for a year or so after it was authorised, Bristol is unlikely to have had the same potential which it has now; however, it proved impossible to ascertain exactly what potential to communicate such information Bristol did have during this period Similarly, Kent's potential to communicate information on these techniques has probably changed more than once since the university was authorised by the Research Councils, again, it proved impossible to ascertain exactly what potential it had at different times. This made it impractical to take timing into account in relation to measure (d)

Notes ⁽¹⁷⁾⁻⁽¹⁹⁾ outline the scoring systems employed, Evaluations 9.11-9.13 show the scores achieved by the participating universities

EVALUATION 9.11: SCORE FOR THE RANGE OF TECHNIQUES EMPLOYED TO LOCATE POTENTIAL LICENSEES/ASSIGNEES

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	15	75
City	7	35
Durham	8	40
Glasgow	15	75
Hull	12	60
Kent	10	50
Liverpool	11	55
Strathclyde	11	55
York	17	85

EVALUATION 9.12: SCORE FOR THE CHARACTER OF THE TECHNIQUES MOST COMMONLY EMPLOYED TO LOCATE POTENTIAL LICENSEES/ASSIGNEES

<u>University</u>	<u>Novel</u>		<u>Intermediate</u>		<u>Familiar</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	1	33	1	33	1	33
City	0	0	0	0	2	100
Durham	0	0	0	0	1	100
Glasgow	1	50	0	0	1	50
Hull	0	0	0	0	2	100
Kent	1	33	0	0	2	66
Liverpool	0	0	0	0	2	100
Strathclyde	1	25	0	0	3	75
York	1	33	1	33	1	33

EVALUATION 9.13: SCORE FOR THE CHARACTER OF THE FULL RANGE OF TECHNIQUES EMPLOYED TO LOCATE POTENTIAL LICENSEES/ASSIGNEES

<u>University</u>	<u>Novel</u>		<u>Intermediate</u>		<u>Familiar</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	4	27	7	47	4	27
City#	2	33	0	0	4	67
Durham	2	25	3	38	3	38
Glasgow	5	36	6	43	3	21
Hull	2	17	6	50	4	33
Kent	2	20	5	50	3	30
Liverpool	2	18	5	45	4	36
Strathclyde	4	36	3	27	4	36
York	5	29	8	47	4	24

NB The data for City are incomplete

It is clear that the range of techniques which each policy-implementer has used/considered using varies considerably. Bristol, Glasgow and York have used/considered using a relatively high proportion of the techniques listed, whereas City and Durham have used/considered using a relatively low proportion. Moreover, the techniques used most commonly by policy-implementers at Bristol, Glasgow and York are just as likely to be novel, from the perspective of academics in science and technology disciplines, as they are to be familiar. In contrast, policy-implementers at City, Durham and Hull most

commonly use techniques with which many academics in and technology disciplines would already be familiar. Indeed, if the guidance given by policy-implementers focusses on those techniques which they use most commonly, academics in these last three universities will be no wiser than they were when they set out to locate potential licensees/assignees on their own initiative. They may not be a great deal wiser at Kent, Liverpool or Strathclyde, either, since the techniques most commonly used by policy-implementers are at least twice as likely to be familiar to such academics as they are to be novel.

If the guidance given by policy-implementers extends to all the techniques which they have used/considered using, researchers at Bristol, Glasgow and York could learn an above average number of techniques, whereas those in City and Durham would be likely to learn a below average number of techniques (though it is important to bear in mind that the data for City are not complete). How helpful would this more extensive information really be, though? It is clear that novel techniques would be in the minority at every participating university except Strathclyde, there, researchers would be just as likely to learn novel techniques as techniques which involved drawing on sources of information already known to them in practice or in principle. However, it is heartening to discover that the policy-implementer at every participating university has used/considered using at least a couple of novel techniques in the search for potential licensees/assignees. If policy-implementers communicate those techniques to researchers, it seems likely that most researchers will end up with more skills than they had when they first notified the university that they had IP with commercial potential. Given that the techniques used/considered by policy-makers at seven of the participating universities fall predominantly into the "intermediate" category, as defined for the purposes of this study, it seems likely that at least some academics will end up with more skills than they had at the outset, the exception is City, which uses no "intermediate" techniques at all.

(e) are academics told how to approach potential licensees/assignees?

There are two subsidiary questions to consider in relation to measure (e) The first concerns principle - the principle that, in order to be able to give potential licensees/assignees sufficient information about a discovery to satisfy their queries without incurring the risk that recipients of this information will abuse that privilege, it is usually advisable to get companies to first sign a confidentiality agreement. (In the case of organisations such as the BTG or the Research Corporation, universities usually reach a global agreement whereby details of any discovery may be disclosed to them without need for a separate confidentiality agreement) The second concerns putting this principle into practice - *ie* drafting a confidentiality agreement which is appropriate in a given case.

Figure 51 shows whether the participating universities alert academics to the need to approach potential licensees/assignees armed with a confidentiality agreement and whether they show academics how they might set about drafting a confidentiality agreement which is appropriate to their particular circumstances.

The scoring system devised in respect of measure (e) took account of these two subsidiary questions; it also took account of timing - *ie* whether academics have been told how to approach potential licensees/assignees ever since the university was authorised by the Research Councils or whether this form of guidance is a more recent phenomenon. Note ⁽²⁰⁾ outlines the scoring system employed, Evaluation 9.14 shows the scores achieved by the participating universities

EVALUATION 9.14: SCORE FOR GUIDANCE IN RELATION TO APPROACHING POTENTIAL LICENSEES/ASSIGNEES

<u>University</u>	<u>Guidance in Principle</u>		<u>Guidance in Practice</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	4	80	0	0
City	2	100	0	0
Durham	5	100	0	0
Glasgow	5	100	0	0
Hull	5	100	0	0
Kent	4	80	0	0
Liverpool	5	100	0	0
Strathclyde	5	100	5	100
York	3	60	0	0

If we aggregate these percentage scores to create a composite indicator of guidance in relation to telling academics how to approach potential licensees/assignees, we obtain the following, descending rank order

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Strathclyde	100	(200/200)
2	City, Durham, Glasgow, Hull, Liverpool	50	(100/200)
3	Bristol, Kent	40	(80/200)
4	York	30	(60/200)

We see that the nine universities exhibit considerable variation. Most of this variation is occasioned by the fact that only Strathclyde is prepared to routinely show academics how to draw up a confidentiality agreement appropriate to their particular circumstances, the other eight universities prefer to use an agreement drawn up by the policy-implementer. (It is worth noting that even at Strathclyde the IP officer described how he tried to "wrong-foot" researchers into asking him not only to draw up the agreement but also to make the first approach to candidate companies.) In contrast, policy-implementers in the nine participating universities uniformly alert academics to the need to approach potential licensees/assignees armed with a confidentiality agreement; the remaining variation is

accounted for by the fact that Bristol, Kent and York do not seem to have provided guidance in this respect every year since the university was authorised by the Research Councils.

(f) Are academics told how to negotiate with potential licensees/assignees?

There are four subsidiary questions to consider in relation to measure (f). The first concerns whether policy-implementers ensure that academics with potentially exploitable IP have an in-principle understanding of the factors which play a part in any agreement to license/assign IP to companies, as opposed to organisations like the BTG and the MoD, which use their own, standard agreements, irrespective of the IP in question. This would entail explanation of the possible terms of any agreement (degree of exclusivity, conditions), and the possible types of return (financial versus non-financial; level, timescale and certainty); it would also entail explanation of the implications of these factors, individually and in conjunction with each other. The second question concerns whether policy-implementers ensure academics develop a grounded understanding of what lies behind agreements to license/assign IP to companies. This would entail explaining the cost and risk often incurred by licensees/assignees and the fact that royalties ranging from > 1-5 per cent are more the norm, whereas substantially higher royalties are rare, except in relation to software. The third and fourth questions concern whether policy-implementers ensure academics understand the procedures entailed in negotiating such agreements and typical negotiating strategies.

It was difficult to elicit hard, objective data in relation to any of these questions. The impression was gained that City, Hull, Strathclyde and formerly Kent seem to go/have gone to some lengths to explain all four points to researchers who have generated potentially exploitable IP. Glasgow, Liverpool and possibly Bristol seem to give some

guidance in this respect, too. However, there is no indication that Durham or York do, or that Kent does today.

In view of the absence of hard data, it was seen as inappropriate to try to objectively evaluate the participating universities in relation to measure (f).

(g) Are academics shown how to draft agreements?

With the possible exception of Strathclyde, none of the participating universities explains to academics how to draft agreements, preferring to have license agreements *etc* drafted either by the policy-implementer or by the university's commercial lawyers - or the two working in tandem, or to modify an agreement proposed by the licensee

(h) Are academics told how to negotiate with licensors/assigners?

This is a pertinent question in situations where academics - or rather the companies they have founded/co-founded - wish to acquire a license from their university to exploit the IP which they have generated. If they have founded their company in partnership with an entrepreneur who has experience of negotiating license agreements, this may not present a problem. If their partner has no previous experience, or they have no partner, this may present them with considerable problems, particularly if they are employed by a university which believes it is appropriate to treat an academic spin-off company seeking a license in exactly the same way as any third party company. Figure 92 shows which of policy-implementers adopt this approach and which believe they would drive a less hard bargain, with a view to supporting someone who is essentially "*on the same side*".

There are five subsidiary questions to consider in relation to measure (h); four of them have already been raised in relation to measure (f) - *ie.* they concern the factors involved

in any agreement to license/assign IP, a grounded understanding of what lies behind agreements to license/assign IP to an organisation which incurs the cost and risk entailed, the procedures entailed in negotiating such agreements and typical negotiating strategies. The fifth concerns whether or not the participating universities refer academics in this situation to sources of assistance, such as the Licensing Executives Society.

As with measure (f), it was difficult to elicit hard, objective data in relation to these questions. It is hard to believe that any of the participating universities would omit to explain the factors which commonly play a part in negotiating a license agreement, or omit to outline the procedures involved. The impression was gained that City, Glasgow, Hull, Liverpool, Strathclyde and, until 1989, Kent would try to give a more grounded understanding of what should be taken into account in the particular deal in question - *eg* the costs of developing, manufacturing and marketing the product, the degree of risk involved - because they would wish to ensure that the company does not unwittingly create obstacles to its own success. Not surprisingly, perhaps, there was no indication that any of the participating universities would go out of their way to advise would-be academic entrepreneurs on negotiating strategies. However, Bristol indicated that it might counsel the academics concerned to bring in an accountant to negotiate/help negotiate on their behalf. Kent's former policy-implementer also felt that he should offer to put such academics in touch with someone inside or outside the university who could guide them in this respect; Kent's current policy-implementer did not see the need, since he felt that the university would be so delighted to see its IP exploited, it would probably agree to any proposal, provided it was not completely unreasonable. None of the other universities gave any indication that they would ensure academics had access to this kind of guidance. Indeed, Liverpool's policy-implementer remarked that an academic would have to represent himself in such negotiations - "*unless he was smart enough to bring in someone*

from [the Licensing Executives' Society]" .

In view of the absence of hard data, it was seen as inappropriate to try to objectively evaluate the participating universities in relation to measure (h). The data presented informally have anecdotal value, however

(j) Are academics taught how to write business plans?

If academics wish to entrepreneurially exploit the IP they have generated, they will need to know how to write a competent business plan, particularly if they need to raise more start-up capital than they have at their disposal. Learning why a competent business plan is necessary and how to produce one is something which universities themselves could teach academics, via their IL office, or perhaps by referring academics to departments whose disciplines equip them with the requisite knowledge. Alternatively, they could point would-be academic entrepreneurs in the direction of local enterprise agencies/trusts, local economic development departments, public sector bodies such as the Scottish Development Agency, regional offices of the DTI or other organisations whose remit includes helping would-be entrepreneurs produce a business plan. Figure 53 summarises the nine participating universities' approach to guiding would-be academic entrepreneurs to write competent business plans.

The scoring system devised in respect of measure (j) did not distinguish between internal and external providers. However, it did take account of conditionality, universities which try to ensure that academics involved in joint ventures/university companies get guidance in relation to their business plan but exclude from their concern those founding/co-founding independent spin-off companies to exploit IP scored less than universities imposing no conditions. The scoring system also took account of timing. Universities

where guidance in relation to would-be academic entrepreneurs' business plans has not been proffered ever since the university was authorised by the Research Councils - where it is a more recent phenomenon or, indeed, a defunct phenomenon - scored *pro-rata*. Note ⁽²¹⁾ outlines the scoring system employed, Evaluation 9.15 shows the scores achieved by the participating universities

EVALUATION 9.15: SCORE FOR GUIDANCE IN RELATION TO WRITING BUSINESS PLANS

<u>University</u>	<u>In-House Provision</u>		<u>External Provision</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	4 0	80	3 0	60
City	5 0	100	2 0	100
Durham	2 5	50	2 5	50
Glasgow	5 0	100	5 0	100
Hull	5 0	100	5 0	100
Kent	3 0	60	2 0	40
Liverpool	5 0	100	5 0	100
Strathclyde	5 0	100	5 0	100
York	2 0	50	2 0	50

The variation which these scores exhibit is due mostly to timing. As Figure 53 showed, Bristol, Kent and York started giving academics direct/indirect help with their business plans some time after the university was authorised by the Research Councils; however, Kent ceased providing this kind of guidance in 1989, less than three years after it started. It is only at Durham that the low score is occasioned by conditionality. Although Bristol, Glasgow and York impose conditions on the guidance which the IL office itself provides, these three universities do try to ensure that academics excluded by these conditions are referred to other sources of advice, Durham is the only participating university which has not been prepared to refer academics founding independent companies to other sources of advice. However, in 1989 Kent, too, adopted this approach and expanded upon it. Kent is not prepared to refer would-be academic entrepreneurs to other sources of advice under

any circumstances, irrespective of the framework in which they plan to operate.

(k) Are academics introduced to venture capital providers?

Start-up companies, particularly those exploiting "hard" IP, usually require more start-up capital than academics can amass from their own resources and connections, even if the university itself acquires an equity stake in the company. Additional capital may be raised from the four main clearing banks, which between them supply some 87 per cent of the finance required by small businesses in the UK ⁽²²⁾. However, this is not venture capital. Venture capital may be raised from the Research Corporation, from members of the British/European Venture Capital Association (BVCA, EVCA), from the venture capital arms of certain banks, from public sector organisations such as the SDA, the BTG ⁽²³⁾, from large companies interested in corporate venturing, and even from private investors.

For a variety of reasons, it proved impossible to get some of the participating universities to provide an exhaustive list of their venture capital contacts. However, the impression was gained that Strathclyde stood out from the other eight universities by virtue of the fact that the IL office has extensive contacts with a variety of venture capital providers, ranging from members of the BVCA to the BTG, 3i Research Exploitation Ltd, the SDA and large companies interested in corporate venturing. Moreover, many of these contacts are tried and tested, in so far as they have participated in joint ventures with the university and members of the academic staff. In contrast, Bristol, City, Glasgow, Hull, Liverpool and York, seemed to have only a few contacts each - usually the regional office of 3i, a bank, the BTG and possibly the Research Corporation. Glasgow also has contacts with the SDA and Bristol has contacts with several companies which have "*a venture capital approach to business*". Kent's penultimate policy-implementer seems to have had quite a few venture capital contacts; under its current policy-implementer it has none, apart from

the BTG and "*the bunch of venture capitalists*" who recently participated in a joint venture with the university and a member of the academic staff. It does not appear that Durham's policy-implementer has contacts with venture capital providers, either.

In view of the absence of hard, comparable data, it was seen as inappropriate to try to objectively evaluate the participating universities in relation to measure (k). The data presented informally have anecdotal value, however.

(l) Are academics told where they might locate suitable start-up premises?

Since many of the participating universities have principled and/or pragmatic reasons for preferring academics to locate their spin-off companies in non-UFC funded accommodation, would-be academic entrepreneurs may well need to find separate start-up premises. Incubator units can generally be found in university science parks; they may also be found in business parks/technology parks *etc* established by local government, the private sector or joint ventures between the two. While it is to be hoped that academics know about their own university's science park, if there is one, they may be completely unaware of other such "parks", if there are any. It is evident that at Bristol and York, where there is as yet no science park and at City, where the science park incorporates no incubator units, would-be academic entrepreneurs may well need guidance as to alternatives. Similarly, if there is a waiting list for science park incubator units at any of the other universities, would-be academic entrepreneurs there, too, may well need guidance in this respect. Figure 54 summarises the policy-implementer's approach in the nine participating universities.

There are really four subsidiary questions to consider in relation to measure (l). The first concerns the extent to which policy-makers in the nine participating universities know of

alternative sources of start-up accommodation. The second concerns how detailed and accurate their knowledge is ⁽²⁴⁾. The third concerns whether or not they impart their knowledge, such as it is, to would-be academic entrepreneurs, or whether they refer them to other likely sources of information, such as directors/managers of science parks, local economic development officers *etc.* The fourth concerns timing - when the university started giving guidance of this nature. Unfortunately, the data elicited were not sufficiently detailed to allow the nine participating universities' performance in terms of these criteria to be accurately evaluated on a comparable basis

(m) are academics given guidance on other aspects of business start-up?

Setting up and running a high-tech business successfully requires not only technical skills but also financial, marketing, recruitment and personnel management skills, to name but a few. In the start-up phase, academics may need to acquire some of these skills themselves; if the company grows, they will need to recruit specialist personnel with the relevant skills and place them in an appropriate management structure. Career academics may not understand the need for this, due to lack of experience, lack of intuition or whatever. As chapter 4 indicated, there is a tendency for would-be academic entrepreneurs to focus on the technology rather than the market, a strategy which could be critical to the success of the company - and possibly critical to the successful exploitation of the IP in question

Alerting would-be academic entrepreneurs to these aspects of business start-up is something which universities themselves could do, via their IL office, or perhaps by referring academics to departments whose disciplines equip them with the requisite knowledge; they might even be prepared to provide hands-on, company-specific guidance, rather than restrict themselves to generalities. Alternatively, they could point would-be academic entrepreneurs in the direction of local enterprise agencies/trusts, local economic

development departments, public sector bodies such as the Scottish Development Agency, regional offices of the DTI *etc*, organisations whose remit includes helping would-be entrepreneurs in this way.

There are three subsidiary questions to consider in relation to measure (m). The first concerns whether the participating universities feel they should give guidance to academics trying to entrepreneurially exploit their research discoveries - general guidance or hands-on, company-specific guidance - on other aspects of business start-up not already considered in section 9 2, or at least refer them to external sources of assistance. The second concerns the kind of guidance which these universities themselves actually give would-be academic entrepreneurs. The third concerns the participating universities' knowledge of other sources of assistance, to complement/take the place of in-house guidance. Figure 55 shows the attitude of the nine participating universities to giving this guidance to academics trying to entrepreneurially exploit their research discoveries; it also indicates the extent to which guidance is available in-house and whether or not these universities are prepared to refer would-be academic entrepreneurs to external sources of assistance. Figure 56 summarises participating universities' knowledge of and contact with external sources of business start-up advice.

The scoring system devised in respect of measure (k) took account of the nine participating universities' attitude to giving would-be academic entrepreneurs guidance on other aspects of business start-up; they were expected to take a positive attitude to giving such guidance/referring academics to external sources of advice. The scoring system did not distinguish between internal and external providers. However, it did take account of conditionality; universities which try to ensure that academics involved in joint ventures/university companies get this kind of guidance - in-house or externally - but

exclude from their concern those founding/co-founding independent spin-off companies to exploit IP scored less than universities imposing no conditions. The scoring system also took into account the extent of participating universities' knowledge of and contact with external sources of business start-up advice. Finally, it took account of timing; universities where would-be academic entrepreneurs have not been given such guidance/referred to external sources of advice ever since the university was authorised by the Research Councils - where it is a more recent phenomenon or, indeed, a defunct phenomenon - scored *pro-rata*. Notes ⁽²⁵⁾⁻⁽²⁷⁾ outline the scoring systems employed, Evaluations 9.16-9.17 show the scores achieved by the participating universities.

EVALUATION 9.16: SCORE FOR GIVING WOULD-BE ACADEMIC ENTREPRENEURS GUIDANCE IN RELATION TO OTHER ASPECTS OF BUSINESS START-UP/REFERRING THEM TO EXTERNAL SOURCES OF ADVICE - PRINCIPLE

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	0	0
City	4	100
Durham	0	0
Glasgow	5	50
Hull	5	50
Kent	2	20
Liverpool	5	50
Strathclyde	10	100
York	2	25

EVALUATION 9.17: SCORE FOR GIVING WOULD-BE ACADEMIC ENTREPRENEURS GUIDANCE IN RELATION TO OTHER ASPECTS OF BUSINESS START-UP/REFERRING THEM TO EXTERNAL SOURCES OF ADVICE - PRACTICE

<u>University</u>	<u>In-House Provision</u>		<u>External Provision</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	4	7	20	67
City	4	67	8	57
Durham	0	0	0	0
Glasgow	12	80	15	43
Hull	0	0	25	83
Kent	6	40	65	20
Liverpool	1	7	25	83
Strathclyde	15	100	35	100
York	2	17	6	25

The low scores achieved by **Kent** and **York** in **Evaluation 9.16** are not simply a function of attitude, but also a function of timing; **York** began to adopt a more positive attitude to providing this kind of guidance in 1989, **Kent** adopted a positive attitude from 1987-89, but now sees it as the academic's own responsibility to obtain advice on these other aspects of business start-up. In the other seven universities, the variation exhibited is due entirely to differences in attitude. With regard to the variation in the scores allocated in **Evaluation 9.17**, in **Bristol**, **Kent** and **York**, some - but not all - of this variation is a function of timing, in the other six universities, it is a measure of how much guidance they actually give, directly or indirectly.

It is noticeable that there is a marked difference between principle and practice in some of the participating universities. **Durham** and **Strathclyde** are very consistent where this is concerned. **Durham** does not see it as the university's responsibility to ensure that would-be academic entrepreneurs have access to guidance in relation to other aspects of business start-up; it neither gives guidance nor refers academics to external sources of guidance. Conversely, **Strathclyde** believes it has a moral responsibility to give would-be academic

entrepreneurs access to this kind of guidance; it not only provides the relevant guidance in-house but it is also prepared to refer academics to all seven kinds of external advice sources identified in Figure 55 City takes a similar view to Strathclyde, but is less effective at putting this into practice, either directly or indirectly. Bristol takes a similar view to Durham, yet Bristol gives would-be academic entrepreneurs access to a certain amount of guidance in-house, and appears just as well equipped as City to refer them to external sources of advice.

It is also noticeable that there is a far from uniform approach to who provides would-be academic entrepreneurs with advice on other aspects of business start-up City and Glasgow have concentrated on providing such guidance as they do in-house - as did Kent formerly, whereas Bristol, Hull, Liverpool and York have concentrated on referring would-be academic entrepreneurs to external sources of advice

If we aggregate each university's scores to create a composite indicator of the guidance which these universities believe they should give - and give in practice, directly or indirectly - in relation to other aspects of business start-up, we obtain the following, descending rank order:

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Strathclyde	100	(300/300)
2	City	75	(224/300)
3	Glasgow	58	(173/300)
4	Liverpool	47	(140/300)
5	Hull	44	(133/300)
6	Kent	27	(80/300)
7	Bristol	25	(74/200)
8	York	22	(67/300)
9	Durham	0	(0/200)

9.3 Summary - Guidance

We are now in a position to assess the overall level of guidance, as defined for the purposes of this study, which each of the nine participating universities provides for academics with IP to exploit, including those who might wish to exploit their research discoveries themselves, in one entrepreneurial framework or another. If we aggregate all the scores allocated in section 9 2, we arrive at the following descending rank order, which shows the overall indicator of guidance provided by each

	<u>University</u>	<u>Overall Indicator</u>	<u>Overall Score</u>
1	Liverpool	76	(1827/2400)
2	Strathclyde	69	(1667/2400)
3	Glasgow	51	(1236/2400)
4	Durham	47	(1132/2400)
5	Bristol	37	(878/2400)
6	Hull	36	(871/2400)
7	York	34	(809/2400)
8	City	24	(580/2400)
9	Kent	21	(492/2400)

It is immediately obvious from this rank order that the large universities, as defined for the purposes of this study, occupy the top three positions, that the medium-sized universities occupy the middle three positions and the small universities occupy the bottom three positions. This raises the question: does the size of a university in any sense provide an "explanation" for the overall level of guidance which is given? On the face of it, this would not be surprising, since the level of guidance given could depend on the combination of in-house expertise and skills and the extent to which external sources of expertise and skills are accessed, where necessary, to complement in-house capabilities. In other words there are, potentially, resource implications, and it is possible that large universities find it easier to provide the necessary resources. Alternatively, the implication could be that this reflects policy-implementers' grasp of what is required in the way of

guidance, and that large universities have recruited policy-implementers whose grasp is superior in this respect to those recruited by smaller universities. However, if either of these explanations were appropriate - or some parallel explanation, we would expect to find this kind of pattern occurring fairly regularly in relation to the aggregate scores for each measure. If we refer back to those aggregate scores, to the "indicators" derived from them, we find that in fact, no such pattern emerges. It looks more likely that this size-related pattern is a coincidence. This illustrates very effectively why it is important to examine the processes which lead to a given situation, rather than jump to speculative conclusions. The processes will be examined, so far as is possible, in section 9.6

9.4 Help: Findings and Evaluation

(n) does the university fund the cost of a patent agent?

There are three main reasons why a university might use a chartered patent agent. The first is to advise on the correct form(s) of protection for a given discovery, on occasions, this may be quite complex and involve several different forms simultaneously ⁽²⁸⁾. The second is to advise whether the discovery conforms to the criteria laid down by UK intellectual property law for the form(s) of protection indicated - *ie.* to obtain what was referred to in section 9 2 (b) as a technical evaluation. The third is to draft/help draft patent/registered design specification(s). Thus, there are three subsidiary questions to consider in relation to measure (n).

Figure 57 shows the most likely source of external advice in the nine participating universities for guidance on the correct form of protection for a given discovery, Figure 58 indicates where each of the nine is most likely to obtain an external technical evaluation of a given discovery; Figure 59 shows the contribution made by patent agents to the process of drafting actual patent/registered design specifications ⁽²⁹⁾ in each of the participating universities

As Figures 57-59 show, several participating universities do not routinely avail themselves of a patent agent for advice in relation to the correct form of protection for complex discoveries, or for technical evaluations, preferring to obtain such advice and evaluation *gratis* from a potential licensee/assignee or a "middle-man" like the BTG. This was not reflected in the scoring system devised in respect of measure (n), however, the main point is that such advice and evaluation should be available to academics with potentially exploitable IP. Since both are available from one source or another in each of the nine, this was not scored at all, it was felt that there was no reason why advice or a technical

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evaluation tendered via potential licensees/assignees or "middle-men" such as the BTG or Research Corporation should be any less valid than that tendered by patent agents employed by the university.

As Figure 59 shows, some of the nine participating universities are less prepared than others to routinely fund the cost of a patent agent to draft patent/registered design specifications, preferring to minimise the patent agent's input or, in one or two cases, do without it altogether if they can. This was taken into account by the scoring system devised in respect of measure (n). It was felt that specifications written by academics with no input from a patent agent could be considerably weaker than those where a patent agent has some input, moreover, if the patent agent's input is restricted to just one end of the process, a preliminary discussion before the academic drafts the specification could well be more effective than the patent agent simply refining the draft produced by the academic without professional guidance. Note ⁽³⁰⁾ outlines the scoring system employed, Evaluation 9.18 shows the scores achieved by the participating universities

EVALUATION 9.18: SCORE FOR FUNDING THE COST OF A PATENT AGENT

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	20	100
City	8	100
Durham	10	50
Glasgow	20	100
Hull	#10	50
Kent	14	70
Liverpool	20	100
Strathclyde	20	100
York	#6	38

Note: # score represents the average of the two procedures employed by the university

Most of the variation in the scores allocated in Evaluation 9.18 is attributable to variations in the strength of the patent/registered design specifications generated/potentially generated by these universities; only Kent's score of < 100 per cent is occasioned by timing. It would appear that - wittingly or unwittingly - Durham, Hull and York may be jeopardising the strength of the protection afforded to inventions/designs generated by members of the academic staff by skimping on the professional support which a chartered patent agent could provide - in situations where the university itself takes out the patent. This form of skimping is not likely to affect these universities' grasp of the correct form(s) of protection for given discoveries, however, nor is it likely to deprive them of a technical evaluation, since all three universities tend to obtain this information via the organisation which provides them with a market evaluation - often a potential licensee/assignee. It may or may not be relevant to note that these three universities are all situated in the north east of England, otherwise, there is no obvious connection between them.

(p) Does the university pay for expert and independent evaluation of potentially exploitable IP?

As indicated in section 9.2, there are three ways in which potentially exploitable IP should be evaluated. Section 9.2(b) revealed that those universities which perceive a need for a scientific evaluation usually undertake this themselves. Section 9.2(b) and section 9.4(n) revealed that the nine participating universities generally seek outside help when it comes to a technical evaluation, either from a patent agent or from a potential licensee/assignee. Section 9.2(b) also revealed that, with the exception of Strathclyde, these universities also seek outside help when it comes to a market evaluation.

Measure (p) is concerned with the type of market evaluation which these universities obtain. Market evaluations obtained from potential licensees/assignees often have a very narrow focus and may also be extremely biased - by the perspective and needs of the company concerned. Market evaluations obtained from public/private sector technology transfer agencies like the BTG and the Research Corporation are less problematical from this point of view. However, they may be influenced by the return on investment which these high-grading organisations perceive the discovery to offer, if it is too low by their standards, they may give a market evaluation which is more negative than is warranted for an organisation which would be prepared to take a lower return on investment. Reliance on the evaluation made by one organisation alone is, in any case, a dubious strategy, stories about highly profitable IP opportunities missed by the BTG are legion. Anyone with potentially exploitable IP needs to obtain a market evaluation which is as expert as possible and as independent as possible - and preferably more than one. There are one or two public sector agencies which may provide an independent market evaluation *gratis*, but in many cases, the only option is to pay for one or more private sector market evaluations from specialists in the relevant field.

Figure 60 summarises the nine participating universities' approach to funding expert and independent evaluation of potentially exploitable IP. The scoring system devised in respect of measure (p) was weighted in favour of universities which are prepared to fund an expert and independent evaluation of potentially exploitable IP whenever necessary. It also took account of timing - *ie.* whether each university has been prepared to fund expert and independent evaluation of IP ever since it was authorised by the Research Councils, or whether this form of help is a more recent phenomenon - or, indeed, a defunct phenomenon. Note ⁽³¹⁾ outlines the scoring system employed to evaluate their approach, Evaluation 9.19 shows the scores achieved by the participating universities.

EVALUATION 9.19: SCORE FOR FUNDING EXPERT AND INDEPENDENT MARKET EVALUATION OF POTENTIALLY EXPLOITABLE IP

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	4	40
City	2	50
Durham	0	0
Glasgow	10	100
Hull	0	0
Kent	0	0
Liverpool	5	50
Strathclyde	5	50
York	0	0

Once again, most of the variation in these scores is occasioned by different attitudes to funding expert and independent market evaluations of potentially exploitable IP, only Bristol's score is occasioned by timing, as well

(q) Does the university pay the cost of acquiring and maintaining patents/registered designs?

There are four subsidiary questions to consider in relation to measure (q) The first concerns whether, in principle, the nine participating universities are prepared to fund the cost of acquiring and maintaining patents/registered designs The second concerns the extent to which in-principle preparedness is translated into financial help, relative to the size of the university. The third concerns the manner in which that financial help is made available - ie whether or not there is a dedicated budget which the policy-implementer can draw upon to cover the costs incurred by using a patent agent for any of these purposes, if not, if the cost is simply covered by a multi-purpose budget administered by the centre, it may prove difficult in practice to get the budget-holder to agree within an appropriate time-scale to cover the cost - or, indeed, to agree to cover it at all. The fourth concerns whether or not the policy-implementer is able to exceed the budget, where there is one - perhaps by means of virement from other budget headings, if not, having a fixed budget

could mean that discoveries identified late in the financial year cannot be protected - or not until the next financial year, alternatively, policy-implementers could end up high-grading IP opportunities from the beginning of the financial year, in order to avoid such a situation

Figure 61 indicates whether the nine participating universities are prepared, in principle, to fund the direct and associated costs of acquiring and maintaining patents/registered designs; it also shows expenditure for 1989/90 and relates this to the size of the university; finally, it indicates whether or not this expenditure is provided in the form of a dedicated budget and whether that budget is more notional than absolute and can be exceeded, if necessary

The scoring system devised in respect of measure (q) took account of whether or not the participating universities are prepared, in principle, to fund the direct and associated costs of acquiring and maintaining patents/registered designs, and it weighted the source of such funding, universities prepared to fund this cost centrally scored more than those which direct academics to make a first call upon their department. Making a first call upon the department inevitably takes longer, which could, in theory at least, delay the process of patenting/registering a design, with the result that a competitor files first; moreover, the additional bureaucracy could deter some academics from bothering to protect their IP at all. If, for whatever reason, the centre - or, indeed, the researcher - sees it as appropriate to get the department to fund the cost, or to offer the department the opportunity to cover the cost/a share of the cost in exchange for a commensurate return, this could be negotiated while the process of patenting a discovery or registering a design is in process, rather than prior to that process commencing. Next, the scoring system took account of the size of each university's expenditure on patents/registered designs, relative to the size

of the university, based on the sums actually expended/available to be expended in 1989/90. Finally, it took account of whether the participating universities make this sum available via a dedicated budget - and whether that budget is more notional than absolute and can be exceeded, if necessary. In each case except the expenditure on patents/registered designs relative to the size of the university - which related specifically to 1989/90, the scoring system took timing into account; universities were expected to have centrally funded the cost of patents/registered designs, to have had a dedicated budget and to have been flexible about that budget since they were authorised by the Research Councils and every year since Notes ⁽³²⁾⁻⁽³⁵⁾ outline the scoring systems employed, Evaluations 9.20-9.23 show the scores achieved by the participating universities.

EVALUATION 9.20: SCORE FOR PREPAREDNESS TO CENTRALLY FUND THE COST OF ACQUIRING AND MAINTAINING PATENTS/REGISTERED DESIGNS

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	10	100
City	2	50
Durham	10	100
Glasgow	10	100
Hull	10	100
Kent	7	70
Liverpool	10	100
Strathclyde	10	100
York	4	50

EVALUATION 9.21: SCORE FOR THE SIZE OF ANNUAL EXPENDITURE ON ACQUIRING AND MAINTAINING PATENTS/REGISTERED DESIGNS RELATIVE TO THE SIZE OF THE UNIVERSITY (1989/90)

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	5	56
City	7	78
Durham	4	44
Glasgow	6	67
Hull	3	33
Kent#	2	22
Liverpool	8	89
Strathclyde	9	100
York#	2	22

Note # although patent expenditure figures are not available for these two universities, their expenditure is known to have been lower than any of the other participating universities

EVALUATION 9.22: SCORE FOR HAVING A DEDICATED BUDGET TO COVER THE COST OF ACQUIRING AND MAINTAINING PATENTS/REGISTERED DESIGNS

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	3 0	60
City	0 0	0
Durham	0 0	0
Glasgow	5 0	100
Hull	5 0	100
Kent	3.5	70
Liverpool	0 0	0
Strathclyde	5 0	100
York	0 0	0

EVALUATION 9.23: SCORE FOR FLEXIBILITY VIS-A-VIS THE BUDGET FOR ACQUIRING AND MAINTAINING PATENTS/REGISTERED DESIGNS

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	0	0
City	-	-
Durham	-	-
Glasgow	0	0
Hull	0	0
Kent	-	-
Liverpool	-	-
Strathclyde	0	0
York	-	-

The scores allocated in Evaluation 9.20 indicate that among the participating universities, it is the norm for the cost of patents/registered designs to be borne centrally - and to have been borne centrally throughout the period since these institutions were authorised by the Research Councils. Only Kent's score of < 100 per cent is occasioned by the fact that this form of help was discontinued in mid-1989, it may well be that Kent will continue to fund the cost of patents/registered designs centrally, but this was not at all certain at the time the fieldwork was conducted. Two universities, City and York, adopt what is, by the standards of this group, an aberrant approach to the question of funding the cost of patents/registered designs both direct the academic(s) concerned to make a first call upon their department to obtain funding. This aberrant approach may explain why neither City nor York has a patent budget, when this is clearly the norm among the participating universities, on the other hand, Durham has no patent budget, either.

Figure 61 and Evaluation 9.21 indicate tremendous variation in the *per capita* sums expended by these nine universities on the direct and associated costs of acquiring and maintaining patents/registered designs. The sum expended by Strathclyde *per capita* (science base only) in 1989/90 is roughly 16 times the sum expended by Hull, seven times the sum expended by Durham and well over three times the sum expended by Glasgow, a neighbouring university which is somewhat larger.

If we aggregate each university's scores to create a composite indicator of help in relation to paying the costs of acquiring and maintaining patents/registered designs, we obtain the following rank order

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Strathclyde	100	(300/300)
2	Glasgow	89	(267/300)
3	Hull	78	(233/300)
4	Bristol	72	(216/300)
5	Liverpool	96	(189/300)
6	Kent	54	(162/300)
7	Durham	48	(144/300)
8	City	43	(128/300)
9	York	24	(72/300)

(r) Does the university temporarily free academics from their primary commitments to allow them to contribute to the process of evaluating and protecting their IP and locating licensees/assignees?

It is not policy in any of the participating universities to temporarily free academics from primary academic commitments to allow them to contribute to the process of evaluating and protecting their IP, locating licensees/assignees *etc.* Academics in every institution are simply expected to find the extra time. In most of the participating universities, the HoD may have no idea that a decision has been taken to embark on the process of evaluating, protecting and exploiting a member of staff's discovery unless that member of staff happens to mention this to them, or tries unilaterally to seek temporary remission from part of his or her workload. It is only at City, apparently, that the HoD is invariably involved in the decision to embark on the process of evaluating, protecting and exploiting a member of staff's IP. The HoD is therefore aware of the extra workload being shouldered by that member of staff, a workload which has been sanctioned both by him/herself and by the university centrally.

In view of the fact that the nine participating universities have a uniform approach to this, undertaking a formal evaluation was not felt to be a worthwhile exercise.

(s) Does the university temporarily free academics from their primary commitments to allow them to become involved in university companies/joint ventures/independent spin-off companies, and if so, on what basis?

There are various frameworks within which academics could legitimately become involved in university companies/joint ventures/independent spin-off companies exploiting their IP. Frameworks which do not entail temporarily freeing academics from their primary academic commitments range from giving would-be academic entrepreneurs permission to devote evenings and/or weekends to such activities to allowing them to devote the time they are allowed for consultancy to such activities. Frameworks which do entail temporarily freeing academics from their primary commitments - so that they can legitimately devote more time to their entrepreneurial pursuits - range from a flexible approach to their normal academic workload to temporary leave of absence, with part-time work as a half-way house. Temporarily reducing the academic's normal workload would be an informal procedure which might entail deferring administrative responsibility for a year or so, or rescheduling undergraduate options, or relieving the academic concerned of responsibility for laboratory sessions *etc etc*. This might sometimes need to be achieved by asking other staff to take on additional work or by paying for cover from outside the department. Whatever the arrangement, the academic concerned would continue to receive his usual salary. In contrast, temporary leave of absence would be a formal arrangement, granted either with pay - on the same basis as a sabbatical - or without pay. Similarly, a formal, part-time contract could be arranged, with the academic either receiving a *pro-rata* salary or full salary for an agreed period, in order to achieve agreed goals.

There are three subsidiary questions to consider in relation to measure (s). The first concerns whether the participating universities are prepared to utilise any of these frameworks. The second concerns the length of free/partially free time which these

various frameworks offer would-be academic entrepreneurs in each university. The third concerns the extent to which the participating universities' are prepared to extend that length of free/partially free time

First, it is worth noting that the centre does not object - in any of the participating universities - to academics devoting evenings and/or weekends, or the time they are allowed for consultancy to entrepreneurially exploiting their research discoveries, provided two conditions are fulfilled. As chapter 7 indicated, in every participating university except Kent, would-be academic entrepreneurs are expected to first seek permission. Condition is uniformly conditional upon entrepreneurial academics treating their primary academic workload as a first call on their time and fulfilling all relevant commitments. However, HoDs may object to entrepreneurial academics spending their consultancy time in this manner, particularly if it involves regular absences, and in every participating university it is the HoD who would have the final say in such a decision; the centre would not intervene in that decision-making process.

As Figure 62 shows, even if the HoD gives permission, the time which academics are allowed for personal consultancy in the nine participating universities varies considerably, in Kent and York there is no limit at all, in Strathclyde and Durham, the limit is roughly half of the time which academics in the other five universities are allowed. Even in Kent and York, consultancy time together with evenings and weekends may not provide an academic with enough time to get a company up and running.

Figure 63 summarises the nine participating universities' approach to temporarily freeing academics from their primary academic commitments on an informal basis - *eg.* by deferring administrative responsibility for a year or so, or rescheduling undergraduate

options, or relieving the academic concerned of responsibility for laboratory sessions *etc etc*. **Figure 64** summarises their approach to granting academics a part-time contract to partially free them from their primary commitments on a temporary basis, so that they can become involved in university companies/joint ventures/independent spin-off companies; **Figure 65** summarises their approach to granting complete leave of absence for the same purpose. **Figure 66** shows how much respite each of these frameworks would offer academic entrepreneurs, whether an extension to the original agreement is likely and if so, for how long

The scoring system devised in respect of measure (s) took account of the number of frameworks which universities are prepared to countenance, centrally, to temporarily free academics from their primary commitments so that they can become involved in university companies/joint ventures/spin-off companies exploiting their research discoveries. In accordance with the CVCP's recommendation that universities should be as flexible and unbureaucratic as possible, the greater the number of frameworks which a university is prepared to countenance, the greater their score. The scoring system also took account of the length of free/partially free time which the relevant frameworks offer academic entrepreneurs in each university. In the light of the prevailing view that technology is most effectively transferred by the movement of people, the greater the free/partially free time which the relevant frameworks offer academic entrepreneurs in each university, the greater their score. Finally, the scoring system took account of the extent to which the participating universities are prepared to extend the free/partially free time which the relevant frameworks offer academic entrepreneurs in each university - the more flexible the university, the greater its score.

Ideally, the scoring system should have taken timing into account - *ie* whether the participating universities offered the same frameworks on the same basis since they were authorised by the Research Councils, or whether there has been an expansion or contraction of the frameworks available or the basis upon which they are offered. However, it proved difficult enough to establish the approach of some of the nine participating universities in 1989/90 ⁽³⁶⁾, let alone their approach in the preceding years. Consequently, this set of evaluations does not take account of timing.

Notes ⁽³⁷⁻³⁹⁾ outline the scoring system employed, Evaluations 9.24-9.26 show the scores achieved by the participating universities.

EVALUATION 9.24: SCORE FOR THE VARIETY OF FRAMEWORKS AVAILABLE TO ENABLE ACADEMICS TO DEVOTE TIME TO ENTREPRENEURIALLY EXPLOITING THEIR IP

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	5	83
City	4	67
Durham	5	83
Glasgow	4	67
Hull	4	67
Kent	6	100
Liverpool	4	67
Strathclyde	4	67
York	6	100

EVALUATION 9.25: SCORE FOR THE LENGTH OF FREE/PARTIALLY FREE TIME OFFERED BY EACH FRAMEWORK

<u>University</u>	<u>1</u> <u>Score</u>	<u>%</u>	<u>2</u> <u>Score</u>	<u>%</u>	<u>3</u> <u>Score</u>	<u>%</u>	<u>4</u> <u>Score</u>	<u>%</u>
Bristol	52	100	-	-	0	0	1	20
City	52	100	2	40	0	0	1	20
Durham	#18	35	5	100	0	0	2	40
Glasgow	30	58	5	100	0	0	1	20
Hull	45	87	-	-	0	0	2	40
Kent	52	100	5	100	3	100	5	100
Liverpool	52	100	-	-	0	0	-	-
Strathclyde	25	48	3	60	0	0	0	0
York	52	100	5	0	1	33	5	100

<u>Key</u>	<u>1</u>	
	<u>2</u>	consultancy time
	<u>3</u>	part-time contract
	<u>4</u>	sabbatical
	-	leave of absence
	-	no information available

Note. # this figure represents the average of 1-2 days/month

EVALUATION 9.26: SCORE FOR THE LENGTH OF TIME BY WHICH LEAVE OF ABSENCE MAY BE EXTENDED

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	1	20
City	1	20
Durham	0	0
Glasgow	1	20
Hull	0	0
Kent	5	100
Liverpool	-	-
Strathclyde	5	100
York	5	100

Key: - no information available

There is a surprising amount of variation in the frameworks within which academics could legitimately devote time to entrepreneurially exploiting the IP they have generated Kent and York are apparently the most flexible where this is concerned and City, Glasgow, Hull, Liverpool and Strathclyde the least flexible

When we look at the scores for the maximum length of free/partially free time offered by each available framework in the nine participating universities, **Kent and York** are consistently the most generous where sabbaticals and leave of absence are concerned, no other participating university can equal their generosity, where part-time contracts are concerned, **Durham and Glasgow** are as generous. Where consultancy time is concerned, the generosity exhibited by **Kent and York** is the norm, rather than the exception, however, here, **Durham, Glasgow and Strathclyde** distinguish themselves by being significantly less generous than the norm

The scores for the length of time by which previously agreed periods of leave of absence may be extended are particularly interesting. They reveal that the nine participating universities divide into two distinct camps. Once again, **Kent and York** - along with **Strathclyde** - are the most flexible/generous, while the others are significantly less flexible/generous

If we aggregate each university's scores to create a composite indicator of help in relation to temporarily freeing academics from primary commitments to allow them to become involved in entrepreneurially exploiting their research discoveries, the impression that **Kent and York** are more helpful than the other seven universities is confirmed

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Kent	100	(600/600)
2	York	89	(533/600)
3	Strathclyde	46	(275/600)
4	Bristol	45	(223/500)
5	Glasgow	44	(265/600)
6	Durham	43	(258/600)
7	Hull	43	(214/500)
8	Liverpool	42	(167/400)
9	City	41	(247/600)

What is striking, though, is that although the other seven universities differ considerably in relation to the frameworks within which they are prepared to countenance academics legitimately devoting time to entrepreneurially exploiting their research discoveries, the time which each offers and the extent to which previously agreed periods of leave of absence may be extended, in terms of this overall indicator of help, they are all remarkably similar

(t) Does the university provide financial help for academics who try to entrepreneurially exploit their research discoveries; if so, on what basis?

Academics attempting to exploit their research discoveries themselves need financial assistance for various purposes. Broadly, these range from undertaking preliminary development work through to company start-up. Accordingly, there are various mechanisms by means of which a university could provide financial help. These include

- * a seedcorn grant;
- * a development grant,
- * guaranteeing an academic's bankloan,
- * providing a "soft" loan from university funds;
- * buying equity in the company,
- * helping solicit matching funds from external sources

Thus, there are two subsidiary questions to consider in relation to measure (t). The first concerns the range of financial help mechanisms set up by each university; the second concerns the level of financial help available under these mechanisms.

Figure 67a shows the range of financial help mechanisms which the nine participating universities have set up. Figure 67b seeks to give an indication of the level of financial help which might be provided under each available mechanism, however, in many cases

universities have either no fixed limit or no idea about the level of funding available under a given mechanism, because they have no experience on which to base a decision.

Ideally, the scoring system devised in respect of measure (t) should take account of these two subsidiary questions. However, the information relating to the level of funding available under the various mechanisms is so scant as to obviate the purpose of evaluating it. Accordingly, the scoring system concentrated on the range of financial help mechanisms set up by each of the participating universities. It also took account of conditionality - i.e. whether certain mechanisms are restricted to certain entrepreneurial contexts. Finally, the scoring system took timing into account - i.e. whether the various financial help mechanisms were established by the time each university was authorised by the Research Councils, or whether all/certain financial help mechanisms are a more recent phenomenon - or, indeed, a defunct phenomenon. Note ⁽⁴⁰⁾ outlines the scoring system employed, Evaluation 9.27 shows the scores achieved by the participating universities.

EVALUATION 9.27: SCORE FOR FINANCIAL HELP MECHANISMS WHICH COULD BE USED TO ASSIST ACADEMIC ENTREPRENEURS

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	2.5	8
City	4.0	33
Durham	1.0	3
Glasgow	25.0	83
Hull	15.0	50
Kent	4.0	13
Liverpool	7.0	23
Strathclyde	10.0	33
York	14.0	58

The significant variation in these scores is due largely to substantial differences in the extent to which the nine universities have established financial help mechanisms which could be used to assist academic entrepreneurs. In Bristol, Liverpool and York, scores

have been reduced to reflect conditionality - i.e. the restriction of certain financial help mechanisms to certain entrepreneurial contexts. Interestingly, it is only in Kent that the score has been reduced to reflect timing - i.e. the university's very recent and very tentative conversion to the concept of financially helping the entrepreneurial endeavours of its staff. In the other eight universities, existing mechanisms date back to the early or mid-1980s - in so far as it is possible to put a date on them.

(u) Does the university permit university companies/joint ventures/independent spin-off companies to use university resources; if so, on what basis?

There are three subsidiary questions to consider in relation to measure (u). The first is concerned with the various physical and human resources which universities provide to facilitate the academic work of members of staff - and whether, in principle, it is university policy to allow academics to use these resources, demand permitting, on behalf of university companies, joint ventures or independent spin-off companies which they have founded/co-founded to commercially exploit their research discoveries. The second is concerned with the basis on which the centre believes use of the various resources should be allowed, universities could allow entrepreneurial academics to use them *gratis*, at cost price, for a fee which yields a marginal profit or for the full, market rate; alternatively, they could consider some sort of *quid pro quo* - or a combination of arrangements. The third is concerned with establishing who actually decides whether a given resource can be used - and on what basis.

Figure 68 shows the centre's policy with regard to entrepreneurial using several different kinds of resource, demand permitting. Figure 69 shows the basis on which use of these resources should be permitted, as far as the centre is concerned. Figure 70 indicates who actually decides in practice whether a given resource can be used - and on what basis.

The scoring system devised in respect of measure (u) took into account the range of physical and human resources which academics in each university are allowed to use in connection with entrepreneurially exploiting their research discoveries. This same evaluation also took account of institutional attitudes to entrepreneurial academics using such resources, those which are reluctant to allow use of certain resources but do so on occasion scored less than those which adopt a more positive attitude - *ie* allowing use, demand permitting. It also took account of conditionality - *ie*. whether the use of certain resources is restricted to certain entrepreneurial contexts; universities which impose restrictions scored less than those which impose no restrictions

Next, the scoring system took account of the basis on which use of physical and human resources is permitted. It was not seen as appropriate for this study to make a value judgement to the effect that universities should allow free use of certain resources or levy only marginal fees in the start-up phase rather than charge would-be academic entrepreneurs the full, commercial rate - or the converse. However, universities which adopt a flexible approach - perhaps allowing academics to offer a *quid pro quo* to be redeemed at a later date in exchange for use of resources now on a preferential basis - were regarded as being potentially more effective "midwives to enterprise" than those which operate a rigid system, this was reflected in their score.

Finally, the scoring system took account of who actually makes the decision as to whether a given resource may be used by an academic entrepreneur and as to the fee to be levied. Universities where the HoD and the centre take such decisions in tandem scored more than universities where it was either a local or a central decision, this was deemed to provide evidence of a more co-ordinated approach, one in which would-be academic entrepreneurs in one department should not be significantly advantaged/disadvantaged by

the attitude of their HoD to such pursuits.

Ideally, the scoring system should have taken timing into account - *ie.* whether the range of physical and human resources academics might use in connection with entrepreneurially exploiting their research discoveries has been the same since the university was authorised by the Research Councils, or whether there has been an expansion or contraction of resources or a change in the basis upon which they may be used. However, it proved difficult enough to establish the approach of some of the nine participating universities in 1989/90, let alone their approach in the preceding years. Consequently, this set of evaluations does not take account of timing. Evaluations 9.28-9.30 show the scores achieved by the participating universities. Notes ⁽⁴¹⁾⁻⁽⁴³⁾ outline the scoring system employed.

EVALUATION 9.28: SCORE FOR THE RANGE OF PHYSICAL AND HUMAN RESOURCES WHICH ACADEMIC ENTREPRENEURS ARE ALLOWED TO USE

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	10	100
City	8	80
Durham	9	90
Glasgow	8	80
Hull	7	70
Kent	5	100
Liverpool	10	100
Strathclyde	6	60
York	9	90

EVALUATION 9.29: SCORE FOR FLEXIBILITY IN RELATION TO CHARGES FOR USE OF PHYSICAL AND HUMAN RESOURCES BY ACADEMICS TRYING TO ENTREPRENEURially EXPLOIT THEIR RESEARCH DISCOVERIES

<u>University</u>	<u>Start-Up Phase</u>		<u>Development/Consolidation Phase</u>	
	<u>Score</u>	<u>%</u>	<u>Score</u>	<u>%</u>
Bristol	6	20	13	43
City	4	17	5	21
Durham	5	17	6	20
Glasgow	13	54	11	46
Hull	3	17	3	17
Kent	11	37	14	47
Liverpool	5	17	5	17
Strathclyde	3	17	3	17
York	11	37	11	37

EVALUATION 9.30: SCORE FOR THE DECISION-MAKING PROCESS IN RELATION TO CHARGES LEVIED FOR USE OF PHYSICAL AND HUMAN RESOURCES BY ACADEMICS TRYING TO ENTREPRENEURially EXPLOIT THEIR RESEARCH DISCOVERIES

<u>University</u>	<u>Score</u>	<u>%</u>
Bristol	0	0
City	3	75
Durham	0	0
Glasgow	4	100
Hull	0	0
Kent	0	0
Liverpool	4	80
Strathclyde	0	0
York	1	20

As Figure 68 showed, universities which adopt an equally positive attitude to academic entrepreneurs using every type of physical and human resource listed are in the minority. It is noticeable, though, that there is little conformity in the resources which they are reluctant to let academic entrepreneurs use, Hull and York exhibit reluctance in relation to human resources (technicians, secretaries *etc*), whereas Strathclyde exhibits reluctance in relation to existing accommodation and Durham is not entirely positive about academic entrepreneurs acquiring extra, on-campus accommodation. There is considerably more uniformity about the resources which the participating universities are against academic

entrepreneurs using City, Glasgow, Hull and Strathclyde are averse to granting academic entrepreneurs extra UFC-funded accommodation in which to pursue their business activities - although, as Figure 68 indicated, there are instances of this happening at Hull and Strathclyde. Hull professes to be against academic entrepreneurs using existing accommodation, too, while Strathclyde draws the line at them using human resources.

Evaluation 9.29 makes it clear that as a group, the nine participating universities are not very flexible in their approach to the charges levied for academic entrepreneurs using their university's physical and human resources. It is noticeable that they exhibit greater flexibility towards enterprises which have reached the development/consolidation phase than those which are in the start-up phase (the aggregate score for the nine universities is 265 in the later phase, but only 233 in the start-up phase). If we look at individual scores, we see that the majority scored just 17 per cent for flexibility in relation to the start-up phase, Glasgow's score of 54 seems quite aberrant in this context. Similarly, the majority scored <22 per cent for flexibility in relation to the development/consolidation phase, Glasgow's score is less aberrant in this context, with Bristol, Kent and York scoring significantly more than 22 per cent, too.

Evaluation 9.30 shows that it is not the norm in this group of nine universities for decisions regarding the charges to be levied for academic entrepreneurs using physical or human resources to be taken by the centre and the HoD in tandem, it is apparently the norm for the HoD to make such decisions locally - though of course the HoD may choose to consult the centre.

If we aggregate each university's scores to create a composite indicator of help in relation to the range of physical and human resources which each allows academics entrepreneurially exploiting their research discoveries to use, in relation to how flexible each is prepared to be with regard to the charges levied and the extent to which the centre and HoDs co-ordinate their decisions, we find considerable variation

	<u>University</u>	<u>Indicator</u>	<u>Score</u>
1	Glasgow	70	(280/400)
2	Liverpool	54	(214/400)
3	City	48	(193/400)
4	Kent, York	46	(184/400)
6	Bristol	41	(163/400)
7	Durham	32	(127/400)
8	Hull	26	(104/400)
9	Strathclyde	24	(94/100)

(v) does the university provide any other form of guidance or help in relation to the process of identifying, evaluating, protecting and exploiting IP?

The only other form of guidance or help which was identified in the course of the fieldwork was the practice of having a representative of the university as a non-executive board member of university companies and joint ventures between the university and members of the academic staff. The university representative could be the ILO, as has happened at Glasgow and Hull, or it could be the Finance Officer - or a member of his/her staff, as has happened at York, for instance. The function of the university representative is partly to monitor the company's progress, but partly to offer advice in the event that the company encounters difficulties. Universities have no right to representation on the board of independent academic spin-off companies - though academic entrepreneurs could, presumably, invite an appropriate member of the university to join the board, no example of this was encountered during the course of the fieldwork, however.

9.5 Summary: Help

We are now in a position to assess the overall level of help, as defined for the purposes of this study, which each of the nine participating universities provides for academics with IP to exploit, including those who might wish to exploit their research discoveries themselves, in one entrepreneurial framework or another. If we aggregate all the scores allocated in section 9 4, we arrive at the following descending rank order, which shows the overall indicator of help provided by each

	<u>University</u>	<u>Overall Indicator</u>	<u>Overall Score</u>
1	Glasgow	71	(995/1400)
2	Kent	68	(945/1400)
3	Liverpool	59	(709/1200)
4	Strathclyde	58	(818/1400)
5	Bristol	53	(687/1300)
=6	York	51	(711/1400)
=6	City	51	(713/1400)
8	Hull	46	(597/1300)
9	Durham	39	(545/1400)

Some of these results may seem rather surprising - particularly the result for Kent, which has been placed at or near the bottom of the rank orders concluding the three principle sections of chapter 8 and the first principle section of chapter 9, similarly, Kent's approach to the role of the researcher in the exploitation process is so ill-defined that it proved impossible to place the university in the rank order concluding chapter 7. This begs the question is Kent stepping out of character with regard to the help which it offers academics with IP to exploit, including those who might wish to exploit their research discoveries themselves, in one entrepreneurial framework or another? It should be remembered that Kent's position *vis-a-vis* many of the measures being explored in section 9 4 is a purely hypothetical one, since the situation being explored has never arisen in

practice; in practice, it might find itself providing a quite different level of help. However, as we shall see, this does not entirely explain Kent's position in this rank order.

9.6 Discussion

(i) Guidance

Measures (a)-(m) are concerned with knowledge and skills which academics will need to acquire if they are to assume responsibility for the commercial exploitation of their IP - particularly if they wish to exploit it entrepreneurially. The performance of the nine participating universities has been evaluated on the basis that policy-implementers should already have or should have acquired the requisite knowledge and skills, or they should have facilitated access to them, by identifying and drawing upon the reservoir of knowledge and skills which exist within the academic community itself or by developing contacts with local or national providers, to whom they can refer academics.

Underlying this are five assumptions, namely that policy-makers concur with the approach adopted by this study, that they have analysed what is required in the way of guidance, that they appoint policy-implementers with as much of the requisite knowledge and as many of the requisite skills as possible, that they facilitate staff development to allow policy-implementers to acquire the knowledge and skills they lack - or encourage them to access other sources of knowledge and skills, as required, and that they communicate to appointees that this is how they expect them to operate.

As we have seen, however, both at the level of individual evaluations and at the level of composite indicators, there is significant variation in the scores allocated to the participating universities - indeed, only four out of 30 individual evaluations do not exhibit significant variation. As indicated, some of this variation is due to timing. Some

universities have not provided certain kinds of guidance continuously since the year they were authorised by the Research Councils; this is usually because a university has been tardy in its appointment of a policy-implementer or because there has been a change - or several changes - of policy-implementer since the university was authorised. However, most of this variation is due to the fact that very few of the participating universities seem to have proceeded on the basis indicated by these five assumptions

The discussion which concluded chapter 7 made it clear that neither Bristol nor Kent has active policy-makers, as far as can be determined, and that policy-makers in some of the other participating universities have not thought coherently about what they require from their policy-implementer in relation to IP in general, let alone what they specifically require in relation to guidance for academics. Thus, it is unlikely that policy-makers at Hull have given much thought to this question, as chapter 7 remarked, having appointed a policy-implementer and given him one or two guidelines - which did not relate to the kind of guidance being considered here, Hull has left it to the appointee's judgement as to how to proceed in practice. This probably equates to the situation at York, too. Moreover, there is evidence to suggest that although Durham's policy-implementer has been given some guidelines, they do not seem to cover the question of providing this kind of guidance - or, if they do, he is ignoring them with regard to certain types of guidance, as we shall see.

It is only at City, Liverpool and Strathclyde that we can be sure that policy-makers have considered in some detail what is required in the way of guidance for academics and communicated their conclusions to policy-implementers - though there is evidence to suggest that policy-makers at Glasgow have given the matter some thought, too. City and Strathclyde did not make any internal documentation available to this study; however,

Liverpool provided documentation ⁽⁴⁾ showing that the policy-implementer is intended to *"advise and assist with patenting, copyrighting and the other forms of protection of University intellectual property . and help with the commercial exploitation of these by way of sale, licensing and royalty agreements"*, *"assist in the transfer of technology between University and Industry, whether directly or through joint ventures involving third parties"* and *"seek new commercial initiatives and opportunities for University exploitation"*. This covers much of the guidance encompassed by measures (a)-(m).

So, in at least five of the participating universities, we can be fairly sure that there has been little or no communication between policy-makers and policy-implementers regarding what is required in the way of guidance - with one notable exception. In the job specification of several policy-implementers (including Bristol's), it is explicitly stated that the appointee is expected to provide guidance/assistance in relation to patenting. Other than this specific example of guidance, at Bristol, Durham, Hull, Kent and York, whatever guidance is provided is - in part at least - a function of the policy-implementer's existing knowledge and skills - and, in some cases, those of the policy-implementer's staff. This is inevitably the situation at the other four universities, too, notwithstanding the fact that policy-makers there have devoted some - and in a few cases, quite a lot - of thought to this question. However, where policy-makers have had some input, one would imagine this should encourage policy-implementers to adopt a coherent approach to guiding academics, one which is perhaps less subject to the personal views and whims of individual policy-implementers.

Let us briefly examine the knowledge and skills of the policy-implementers appointed by the nine participating universities. In both Liverpool and York the policy-implementer is a former member of the academic community - an engineer and a scientist respectively. In

both Durham and Glasgow the policy-implementer is an accountant currently/formerly working in the university administration; Kent's current policy-implementer is a career administrator - with responsibility for academic affairs At least two of Kent's former policy-implementers came from a career in industry and possibly the third, too; policy-implementers at Bristol, Hull and Strathclyde were also recruited from industry - a marketing man in Hull's case, an engineer in Bristol's and Strathclyde's - both of whom had considerable commercial experience City's policy-implementer is a career administrator who has reached what might be described as the peak of his chosen career - as Secretary to the university, however, he has both an interest in and experience of the exploitation of IP through his previous post at another university

On their own admission, most of these policy-implementers lack at least some of the knowledge and skills which this study has defined as appropriate Policy-implementers at Liverpool and York took up their job facing the greatest handicap in this respect - as did Kent's current policy-implementer The existing knowledge and skills of policy-implementers at Bristol and Strathclyde were undoubtedly the most extensive - but less so Hull's, since the policy-implementer's commercial experience had nothing to do with with the identification, evaluation or protection of scientific or technical IP There is no evidence that the staff development programme in any of the participating universities has organised short courses to widen policy-implementers' existing knowledge and skills However, in 1989/90 policy-implementers in six of the participating universities were members of UDIL and as chapter 5 noted, UDIL has identified the need for training in relation to the exploitation of IP and begun to arrange for seminars to take place at the same time as its twice-yearly meetings UDIL also flags courses offered by other organisations, such as the course on protecting IP which the Patent Office initiated in 1990 especially for ILOs in higher education institutions ⁽⁴⁹⁾ The emphasis is very much on

matters related specifically to protecting, evaluating and licensing/assigning IP, rather than more entrepreneurial ways of exploiting it, however. Moreover, there is evidence to suggest that, in the recent past, certainly, policy-implementers have not, on the whole, responded to initiatives which have not been given UDIL's immediate *imprimatur* ⁽⁴⁶⁾.

Policy-implementers at City, Durham and Kent were not members of UDIL in 1989/90.

City's UDIL representative was a member of the academic staff who markets the university's consultancy capabilities; Durham's was the director of the university's commercial research laboratory, and Kent's was the managing director of KSIP. There is evidence to suggest limited, informal lines of communication between the UDIL member and policy-implementer in all three universities, but no evidence that these three policy-implementers have attended courses run by UDIL in relation to the exploitation of IP.

However, all three have attended short courses run by other organisations, such as the Patent Office, here, too, the emphasis seems to be very much on protecting, evaluating and licensing/assigning IP, rather than more entrepreneurial ways of exploiting it, however

Few of these policy-implementers have gained access to the knowledge and skills they lack by drawing upon the reservoir of skills which exists within the academic community itself

On the face of it, one wonders why, given the range of expertise which many of the participating universities appear to have. Although York has no departments which would be likely to provide a reservoir of knowledge and skills related to the legal or business aspects of exploiting IP, the other eight universities all have departments which could conceivably provide such a reservoir. Ironically, given the extent of the policy-implementer's existing knowledge and skills, one of the best resourced in this sense is Strathclyde, which has a flourishing business school, its departments include accountancy

and finance, marketing, management science and law City is also well resourced in this sense, with a postgraduate business school as well as departments of accountancy, business studies, and banking and finance. Durham has a highly regarded business school; it is also one of the UK's Regional Enterprise Centres, as is Bristol, both Durham and Bristol also have a law department Kent has a postgraduate business school, while Hull has departments of law and management. Liverpool is less well resourced in that the only departments which appear to be of value in this respect are economics & accounting and law.

Liverpool's policy-implementer is very much in favour of the idea of creating a reservoir of knowledge and skills within the university which he - or academics with IP to exploit - could draw upon:

"One of my fondest hopes is that each university could become a Peat Marwick. [...] This is something we have thought about, though how exactly we would go about it . . . One would like one academic to ring up another and not go via us If it is through us, it becomes a little more formal" ...

However, he feels constrained by time and resources from developing this project at the moment York's policy-implementer would like to be able to draw upon a reservoir within the university and expressed concern about what he sees as the total absence of suitable knowledge and skills within the academic community. Bristol's policy-implementer is open to the idea of drawing upon knowledge and skills within the university, but feels that despite some departments having promising names, in practice their knowledge and skills are not appropriate to the task. He acknowledges that there are individuals whose knowledge and skills are appropriate and has been known to refer academics with IP to exploit to such individuals for advice. He would like, one day, to create a directory of such expertise. However, identifying a meaningful number of willing individuals with the

right expertise is no easy matter and at present, he does not regard it as a priority activity. These three policy-implementers have not created a database - or even a formal record - of academics who have founded/co-founded a company to exploit their research discoveries, to whom they could refer fellow academics with similar ambitions. York's academic entrepreneurs are sufficiently well known on campus that a formal list might not be necessary, however.

Several policy-implementers were less positive about the likelihood of resources lying untapped in the academic community. Hull's policy-implementer dismissed the law department out of hand on the basis that it is "*academic rather than commercial*"; his reason for dismissing the management department was given off-the-record. Durham's policy-implementer gave a more specific reason for dismissing the law department there: the department has to bring in a practicing commercial lawyer to teach this aspect of law. Since the departure, in the early 1980s, of a lecturer who specialised in intellectual property law, the department lacks the kind of knowledge and skills which might be required by academics with IP to exploit. He concedes that the business school is undoubtedly a tremendous resource, but does not feel it is incumbent upon him to refer would-be academic entrepreneurs to the business school, unless they propose to establish a university company or a joint venture with the university. This is clearly his own, idiosyncratic view. It does not coincide with that of Durham's policy-makers, who feel that the business school has been given substantial government funding for the purpose of nurturing small businesses in the north east - and that would-be academic entrepreneurs should be referred to it, irrespective of the framework in which they propose to operate. Glasgow's policy-implementer has not developed contacts of this sort within the university because he feels that academics could not operate within the tight timescales required. He has not been able to identify any individuals or groups operating consultancies in

appropriate areas, who might be able to respond more quickly - with the exception of the department of management, which has more than enough clients already. However, he believes that the Enterprise in Higher Education initiative could change things, in the long-term. Kent's current policy-implementer has not even begun to consider whether the university itself might provide a reservoir of knowledge and skills upon which he - or academics with IP to exploit - might draw; he expressed surprise at the suggestion that he might refer would-be academic entrepreneurs to the business school.

Again, these four policy-implementers have not created a database - or even a formal record - of academics who have founded/co-founded a company to exploit their research discoveries, to whom they could refer fellow academics with similar ambitions. As with York, Hull's academic entrepreneurs are sufficiently well known on campus that a dedicated list might be superfluous. However, the policy-implementer has doubts about the value of sending would-be academic entrepreneurs to talk to those with more experience, he believes that some have found it a less than positive experience and would not want fellow researchers to be put off by their negativism. Durham's policy-implementer would not be in a position to create a database - or even a record - of academic entrepreneurs, even if he wanted to, only the vice-chancellor knows which members of staff have founded companies and, in keeping with Durham's tradition, he does not readily divulge this information. It is only at Strathclyde - and possibly Glasgow - that would-be academic entrepreneurs might be encouraged to talk to colleagues with more experience, be it negative or positive.

In the main, then, policy-implementers have tended not to draw upon a reservoir of knowledge and skills within the academic community due to a variety of actual or perceived constraints; it is only in the case of Kent's current policy-implementer that we

can say without reservation that this has not happened because he has not thought of it - though where the business school is concerned, Durham's policy-implementer is clearly motivated not by an actual or perceived constraint, but by his own, personal assessment of what is appropriate. However, several policy-implementers mentioned that they have drawn upon the knowledge and skills of other members of the university, such as the staff of the finance office or even lay members of court.

Policy-implementers have clearly accessed at least some of the knowledge and skills they lack by developing contacts with local or national providers outside the university. For instance, as chapter 7 noted, it is only at Bristol and Strathclyde that the policy-implementer and principal policy-implementer respectively have prior experience of conducting license/assignment negotiations, though Kent's former policy-implementer also did, and Glasgow's policy-implementer has previous experience of negotiating commercial deals of various sorts. It is only at Strathclyde and Kent that policy-implementers do not seem to have drawn upon the knowledge and skills of outsiders when it comes to negotiating with potential licensees/assignees. Policy-implementers at the other seven universities have sought assistance, preferring to rely on insiders (*eg* the staff of the finance office or a member of court) or outsiders with whom the university already has a relationship, rather than use hitherto unknown organisations. Policy-implementers at Bristol, Glasgow, Liverpool and York have joined the Licensing Executives Society (LES) - but none of them has yet brought in an LES member to assist them.

It is also clear, though, that policy-makers have not accessed all the knowledge and skills which they might have done, in an ideal world. The earliest stage of the exploitation process - namely, guidance with regard to identifying potentially exploitable IP - provides an example of this. Only York has commissioned a comprehensive technological audit

during the 1980s, the other eight have tended to rely on the BTG rooting out discoveries in the course of regular or *ad hoc* visits. Most are keenly aware of the need for a comprehensive audit - and one or two have been approached by the Research Corporation with a view to doing this. However, Liverpool's response was probably typical - it felt it could not afford the £5,000 or so which this would cost⁽⁴⁷⁾. There is little doubt that many of the participating universities will have welcomed remarks made by the Secretary of State for Trade & Industry indicating that the DTI would be funding part of the cost of a technological audit in a limited number of higher education institutions, as detailed in chapter 1.

Sometimes it is not a lack of funding so much as the desire to rely on professionals which seems to account for the fact that policy-implementers have sought neither to acquire particular knowledge and skills which they lack, nor to develop contacts with outside experts to whom they could refer academics for guidance. This desire often seems to be based on the belief that academics could not really benefit from such guidance, could not learn how to undertake particular procedures. Technically evaluating IP comes into this category, for example. It may be that policy-implementers overestimate the difficulties, since those in the nine participating universities have only a limited knowledge of IP law, independent inventors often undertake a technical evaluation of their discoveries on their own initiative, using the search and advisory services of the Patent Office. Obtaining a market evaluation of IP comes into this category, too. Again, it may be that policy-implementers with no previous experience of this overestimate the difficulties, it is noticeable that the principal policy-implementer at Strathclyde, who has considerable experience, feels confident that academics can be taught how to arrive at a reasonable idea of the market value of their discovery by their own efforts, if they are willing to learn

It is clear, then, that the guidance provided by any individual university is, in part at least, a function of the policy-implementer's existing knowledge and skills - and, in some cases, those of his staff, augmented, perhaps, through attending short courses, and complemented to a certain extent by developing contacts with local or national providers to whom he can refer; the extent to which this happens is dependent upon actual or perceived constraints, or the general tenor of university policy - or, in some cases, the policy-implementer's own, personal view or philosophy.

This is by no means the whole story, however, for there is often a discrepancy between the guidance actually given to academics with IP to exploit and the knowledge and skills available to the policy-implementer - whether existing, newly-acquired or accessed indirectly. The explanation for this is sometimes highly case-specific. Measure (b) provides an example of this. Strathclyde's IP officer is fully aware of the need to scientifically evaluate IP; however, he does not communicate this to researchers - nor does he undertake a scientific evaluation himself, by checking with the HoD, for instance. He sees this as a highly sensitive issue, politically, and regards it as more astute to take the researcher's own evaluation at face value. In contrast, York's policy-implementer tries to scientifically evaluate IP by means of peer review - both within the university and outside it; he is even prepared to seek the opinion of fellow scientists from other countries, if he feels it is necessary. It is not clear why academics at York are prepared to submit to this, whereas those at Strathclyde apparently are not. Of course, this may not be an accurate analysis of the situation, it may be that Strathclyde's policy-implementer is more attuned to researchers' sensitivities than York's, having been a laboratory technician there himself - or that York's policy-implementer is less confident than Strathclyde's, given his academic background. (This may also explain why York's policy-implementer reported having used/considered using a far higher proportion of techniques to locate potential

licensees/assignees than Strathclyde's policy-implementer - or, indeed, any other policy-implementer)

Measure (a) provides a second case-specific example. Liverpool's policy-implementer believes that academics are more open to messages concerning the importance of notifying him of potentially exploitable IP before disclosing it if the messenger comes from within the university, rather than from outside, this is why Liverpool did not respond to the Patent Office "Roadshow" in the positive way that Hull did, for instance Measure (c) provides a third example. Durham's low score for guiding academics in relation to the procedures and costs entailed in different types of IP protection is probably due to the university's reluctance to bear the cost of acquiring patents, since it pursues a policy of getting licensees/assignees to pay the cost and makes no promises to researchers concerning the resulting delay on publication, the policy-implementer presumably feels there is no need to give academics guidance in this respect. Measure (h) may provide a fourth example, though it seems more likely that it is the personality or philosophy of individual policy-implementers which influences whether or not they refer would-be academic entrepreneurs to sources of assistance in relation to negotiating a license/assignment from the university.

There seem to be only one or two examples of a uniform - or virtually uniform - discrepancy between the guidance actually given to academics with IP to exploit and the knowledge and skills which the policy-implementer has/has access to. Measure (e) is one such example. Policy-implementers in all nine universities guide academics as to the need to approach potential licensees/assignees armed with a confidentiality agreement, only Strathclyde is prepared to give academics guidance when it comes to drawing up a confidentiality agreement in practice. This is in keeping, of course, with Strathclyde's

declared approach to the role of the researcher in the exploitation process. However, what is more puzzling here is the fact that none of the other universities show academics how to draw up a confidentiality agreement. It is almost certain that in the majority of participating universities, policy-implementers base specific confidentiality agreements on sample agreements provided by UDIL in the second volume of their 1988 report (UDIL, 1989) - or on earlier agreements drawn up for the university. This begs the question: why should academics not adopt the same tactics - and thereby acquire a new skill?

It is worth considering whether other factors could account - or partially account - for the significant variation in the scores allocated to the participating universities. Could there, for instance, be a connection between a university's performance relative to the others in the group and university type, or objective factors such as university size, size of the science base, the severity of the cuts imposed by the UGC in the early 1980s *etc* - or a combination of these factors? If we look at the composite indicator of guidance in relation to measure (a), it is noticeable that the universities in the top half of the rank order are all large or medium-sized, whereas those in the bottom half tend to be small or medium-sized. Could it be that smaller universities rely more on the grapevine and on chance, face-to-face contact between researchers and the policy-implementer to disseminate messages concerning the importance of notifying the university of potentially exploitable discoveries before disclosing them in any way? Conversely, could it be that larger universities accept the need for formal dissemination mechanisms more readily than smaller ones?

Before we jump to this simple conclusion, it is worth noting that where measure (a) is concerned, the three universities treated most harshly by the UGC in the early 1980s (as defined for the purposes of this study) occupy the three lowest positions in the rank order,

while those treated most leniently occupy the middle-to-top half of the rank order and two of the three treated neither particularly harshly nor particularly leniently occupy the middle ground. Could it be that universities which were hard hit financially saved money by cutting corners when it came to disseminating messages about notifying the university before disclosing potentially exploitable IP - by not holding seminars, by not circulating members of staff, by not bringing in outside speakers? It is probably relevant to note that there is no connection between the relative severity of the cuts and each university's performance, as indicated by the composite indicators of guidance in relation to measures (b)-(m) This begs the question why should hard-hit universities save money in respect of measure (a) but not in respect of measures (b)-(m)? It is probably wise to dismiss this as coincidence

Although there seems to be no connection between a university's performance with regard to measures (b)-(m) and university size or the size of the science base or the severity of the cuts imposed by the UGC in the early 1980s, there may be a connection between performance and type of university. If we look at the composite indicator of guidance in relation to measure (b), for instance, it is noticeable that the two ex-CATs occupy the top two positions in the rank order, the two plate-glass universities occupy the two bottom positions and the middle ground is occupied by the two ancient universities and the three civics. A similar pattern can be observed in relation to measure (c) and, to a certain extent, measure (m), indeed, if we focus on the guidance on other aspects of business start-up given by the nine participating universities in practice as opposed to principle, the similarity is even stronger. Is this simply coincidence, or is there a genuine association between type of university and any or all of these three measures? What might the connection be between university type and giving academics guidance on how to evaluate the potential of their IP, how to go about protecting their IP and other aspects of business

start-up? It is tempting to conclude that the two plate-glass universities, consciously founded on the Oxbridge model, are ivory towers, relatively speaking, whereas the two former CATs have their feet more firmly anchored in reality, while the civic and ancient universities occupy the middle ground. However, it is probably more pertinent to consider whether it is appropriate to come to any conclusion when this pattern is found in only two composite indicators out of a total of seven, though a third exhibits many similarities.

(ii) Help

Measures (n)-(u) are concerned with the tangible and intangible resources which academics are likely to need if they are to assume responsibility for the commercial exploitation of their IP - particularly if they wish to exploit it entrepreneurially. The performance of the nine participating universities has been evaluated on the basis that they should provide the tangible and intangible resources detailed. Underlying this are four assumptions, namely that policy-makers tacitly concur with the approach adopted by this study, that they have analysed what is required in the way of tangible and intangible resources, that they have argued for these successfully at policy and resource committee and other relevant committees, and that they have communicated the existence and purpose of these resources to policy-implementers. Once again, though, both at the level of individual evaluations and composite indicators, there is significant variation in the scores allocated to the participating universities - indeed, only two out of 17 individual evaluations do not exhibit significant variation. As indicated in section 9.4, some of this variation is due to timing: some universities have not provided certain kinds of resource continuously since the year they were authorised by the Research Councils. However, most of the variation is due to the fact that very few of the participating universities seem to have proceeded on the basis indicated by these four assumptions.

The resources encompassed by measures (n)-(u) can be grouped under three broad headings - financial, physical/human resources and time. It is common for decisions concerning each type of resource to be made by different groups. In the wake of the Jarratt Report, it is usually the policy and resources committee (or equivalent) which decides what proportion of the discretionary recurrent income is allocated to each cost centre each year. Where IL offices are concerned, the policy-implementer may simply be allocated an overall sum and left to decide his own spending priorities - as seems to happen at Hull, alternatively, the policy-implementer and his line manager may jointly determine the relevant budget headings and the relative weight of each budget heading and submit a bid on this basis - as seems to happen at Bristol, a third possibility is that the policy and resources committee itself breaks down the overall sum into relevant budget headings - as seems to happen at York. Thus, the decision whether or not to establish a patent budget - and if so, how much to put into it - could be taken at any one of three different levels. Principled decisions concerning financial support for academics who try to exploit their research discoveries entrepreneurially could be taken by a number of different groups, depending on the way in which the university conceives of this activity. If it is conceived of as a subsidiary activity of a general "development" or "innovation" fund, set aside from general funds - as happens at Glasgow, it may be the policy and resources committee which makes this decision. If it is conceived of as something to be paid for out of the university's private funds, the decision to go ahead with this - and if so, the level of financial commitment - could be taken by the policy and resources committee, by an *ad hoc* group established for the purpose - as seems to happen at Strathclyde, or by the group responsible for making decisions about the university's investment portfolio, as happens at Kent. Principled decisions as to whether entrepreneurial academics may use the university's physical/human resources - and if so, at what cost - may be taken centrally, by the finance office, or locally, by a HoD. Principled decisions concerning

time could be taken by two or three different groups - the outside work committee (or equivalent), the leave of absence committee and possibly a special sabbaticals committee.

It is clear, then, that policy-makers who have analysed what is required in the way of tangible and intangible resources - and concur with the approach adopted by this study - will usually need to have liaised with a number of different policy-formulating and/or decision-making groups and tried to reach a consensus. For instance, it will probably be necessary to establish whether the leave of absence committee is prepared to treat company start-up as grounds for granting leave of absence, whether this is an acceptable way of spending a sabbatical *etc etc*. It might also be necessary to consider procedural questions - for instance, whether the case for leave of absence should be put by the applicant alone, or actively supported by the policy-implementer or even policy-makers *etc*, though this question might be progressed by the policy-implementer rather than policy-maker(s).

Given the observations made so far concerning the role of policy-makers in the participating universities, it will be no surprise to learn that, with one or two exceptions, policy-makers have not addressed the question of the help their university provides as coherently or comprehensively as this. The exceptions are Strathclyde and City. At Strathclyde the policy-maker - effectively, the Principal, assisted by the principal policy-implementer - has certainly done so. Thus, we may be sure that where Strathclyde scores < 100 in any individual evaluation, it is for a principled reason, which will be explored in due course. Whereas Strathclyde has evolved a policy in relation to each form of help, City seems to prefer a more *ad hoc* response to some forms (which is why this study lacks data for City in respect of certain measures), with regard to others, City's policy-maker does not entirely concur with the approach adopted by this study, as we shall see.

In several participating universities, policy-makers seem to have considered some aspects of help, as defined for the purposes of this study, but not others. Thus, for instance, policy-makers at Durham, Glasgow, Hull, Liverpool and York have not coherently addressed the question of giving would-be academic entrepreneurs time to pursue their business activities legitimately - indeed, it is not certain that they have addressed it at all. At Liverpool, for ULTRA certainly made no provision for academics to be given time to pursue their business activities. Policy-makers at York have not coherently addressed the question of providing certain forms of financial help for academics with IP to exploit. In Bristol and Kent, of course, there does not seem to be a group of active policy-makers - or even an individual, other than the policy-implementer himself - who could address the question of help coherently.

Policy-makers at Hull have addressed certain aspects of financial help, but failed to communicate their conclusions to the policy-implementer. In the early 1980s, for instance, they created a patent fund, rather than an annual patent budget. The intention was to use the patent fund as the precursor of an annual budget, basing the size of the annual budget on the time it took to spend the initial provision of £15,000. As indicated in the case study narrative for Hull, this plan went awry when policy-makers forgot to tell the policy-implementer, appointed some two years later, that the patent fund existed. The policy-implementer's response to this situation was not to argue for a patent budget, but to divert sums from his overall annual budget to pay for patent protection and to cut as many corners as possible - until 1990 when, by chance, he discovered the existence of the fund. This means that that Hull has not yet achieved its objective of using the patent fund to ascertain how large an annual patent budget might need to be. Since the policy-implementer sees no problem in cutting corners by getting academics to draft patent/registered design specifications with little or no guidance from a chartered patent

agent, it may be some time before Hull gets an idea of the optimum size of budget.

Some policy-implementers are all too aware of the gaps in their university's provision and a few have argued - as yet unsuccessfully - for provision to be made. Policy-implementers at several participating universities have found that policy-makers/line managers/members of the policy and resources committee cannot or will not grasp why it may be advisable to commission a market evaluation of a discovery, for instance. It may or may not be relevant to note that these particular universities are all small or medium-sized, as defined for the purposes of this study, their apparent failure to grasp the value of this kind of research may, of course, be strategic rather than genuine, motivated by financial considerations. Policy-implementers at Kent and York have recently started arguing for a patent budget to be established. Kent has not had to confront this question before because until 1989, patents were funded from the income of KSIP. It is arguable whether Kent ever got around to deciding that this was how patents should be funded in the first place, there is evidence to suggest that KSIP's managing director simply started funding the cost by default. In York's case, the finance officer was responsible for IP for many years. Clearly, he was in an ideal position to lay his hands on spare funds, when he felt the situation justified it, and to get the vice-chancellor's agreement informally. He has now retired, replaced by a finance officer recruited from industry. The policy-implementer claims that the new finance officer is unwilling to establish a formal patent budget unless it can be demonstrated that the university will get a return on its money; the policy-implementer feels he can offer no guarantees on this score and that even if he could, the lead time would be incalculable in most cases. This situation is complicated by the fact that in the past, some of York's academics have been enterprising enough to persuade their departments to fund the cost of patents. There seem to be elements in the university administration who are happy for this situation to continue. York's policy-implementer

has virement between budget headings and does his best to fund the cost of patents, cutting every corner he can; he is concerned about the diminished quality of the resulting patents, however. Likewise, he is concerned about having to seek a market evaluation - and sometimes a technical evaluation, too - from potential licensees/assignees, rather than accessing the knowledge and skills of independent experts.

City does not have a patent budget either, of course, but for entirely different reasons. For several years, City has received a handsome return from the activities of its first university company, set up to exploit gas sensor technology. The income to the university has been channelled into a technological development fund, which is used to pay for patents and other forms of IP protection. City's policy-maker/implementer has deliberately avoided establishing a formal patent budget, as indicated in the case study narrative for City; he believes that budgets must either be adhered to, leading to possible opportunity costs, or exceeded, which could provoke a negative response from the uninitiated.

Durham has no patent budget because the university does not believe it would be likely to get a return on its expenditure. It prefers to persuade licensees/assignees to cover all the costs associated with patenting upfront, rather than try to recoup them retrospectively, thereby incurring the risk of a company refusing to pay. As indicated, it is extremely unusual for Durham to pay for patents itself, and when it does, it simply covers the cost from general funds. Durham's policy-implementer, an assistant treasurer, is completely in sympathy with this approach.

While those policy-implementers who want their budget to cover the cost of market evaluations and patent protection may eventually triumph with regard to this kind of financial help, it is less certain that they will do so where financial help for academics

trying to exploit their research discoveries entrepreneurially is concerned - particularly help in the form of equity or soft loans. There are several reasons for this. First, with the possible exception of Glasgow, there is no evidence that policy-implementers in the participating universities have dreamt up and promoted the concept themselves, with the exception of Liverpool and Strathclyde, where the idea originated with key members of the administration, it was first mooted by individual members of the academic staff. In Hull, for instance, the policy-implementer simply transmitted the proposition to his line manager. In York, the academics concerned dealt directly with policy-makers or key figures in the administration, rather than through the policy-implementer. Similarly, Kent's first joint venture with a member of the academic staff was launched after a senior academic contacted the vice-chancellor directly, the joint venture in question involved the setting up of a new local radio station, not the exploitation of a research discovery, but it was only after this proved to be highly successful that the university became involved in its first joint venture to exploit IP together with the academic who generated it and a third party.

Second, some policy-implementers - most notably Liverpool's - are not entirely in sympathy with the idea of the university diverting some of its hard-pressed funds to support private companies founded/co-founded and managed/co-managed by academics. There are at least two dimensions to their concern: the resourcing of a non-academic activity at the expense of mainstream academic activities and doubts about the ability of academics to set up and run successful companies.

Third, even if policy-implementers are in sympathy with the idea, in universities which have proved willing to provide this particular kind of financial help, the concept has invariably been championed by a very senior member of the administration: the bursar and

subsequently the new principal at Strathclyde, the finance officer and the vice-chancellor at York and the registrar at Hull, for instance, it is only at Bristol that the lead seems to have been taken by a working party composed chiefly of senior academics. It is difficult to gauge how much chance plays a part in this - the chance of appointing that particular administrator, vice-chancellor/principal - and how much it is a consequence of the university concerned deliberately appointing someone known to favour such an approach. Whichever it is, it seems likely that in the case of a university like, say, Durham, it could well require the appointment of a "new broom" - a very senior "new broom" - to persuade the university to think along these lines and to actually act upon it. Policy-implementers alone are unlikely to have much impact on their university's policy in this respect.

The nature of the policy-making process may also make it difficult for policy-implementers to have much - if any - impact, one way or the other. In some universities, the decision to provide financial help for academics who try to entrepreneurially exploit their research discoveries needs to be taken, or at least endorsed, by court and possibly senate before it can be implemented. At Bristol, for instance, working party recommendations with regard to financial support for spin-off companies were approved by senate and court at the outset, albeit in a very vague way. This policy-making process was sufficiently open that once the policy-implementer was appointed, he was able to attend a meeting of court and persuade members to minute this in more detail. In Hull, Kent and York, providing equity for companies founded by academics to exploit their research discoveries seems to have required a less formal process. The decision was apparently taken by a very small group; it was doubtless reported to court but no prior approval seems to have been sought. Policy-implementers may not be in a position to influence that kind of decision-making process, particularly if they are on the periphery of the administration or adjacent to it, in organisational terms - indeed, they may not even

know that discussion is taking place; this problem may be exacerbated if the policy-implementer is relatively junior ⁽⁴⁶⁾. Moreover, unless efficient communication between policy-makers and policy-implementers is ensured, the policy-implementer may not realise that a decision regarding financial support for academic entrepreneurs has been taken, despite its relevance to his *modus operandi*. There is evidence to suggest that Kent's former policy-implementer learned about the university's participation in the radio station venture in the same way as the rest of the academic community. In other words, the message that joint ventures between the university and members of the academic staff were now feasible came via an indirect route; it was subject to delay and was more oblique than it might have been, because it did not occur to the administration to send the policy-implementer a direct, unambiguous message.

Whereas most policy-implementers seem to be aware of omissions on the part of policy-makers and/or constraints imposed - wittingly or unwittingly - in relation to certain forms of financial help, very few seem aware of similar omissions and/or constraints in relation to the time needed by academics wishing to exploit their research discoveries entrepreneurially. Glasgow's policy-implementer is exceptional in this sense, he is well aware of the difficulties imposed by the time-consuming, iterative procedures which the system demands in respect of the needs of academic entrepreneurs and would like the university to devise a new system which places fewer obstacles in their path. In most of the participating universities, policy-implementers seem to have devoted little or no time to considering this sort of help. This is particularly noticeable in universities where the policy-implementer was recruited from industry, in Bristol and Hull the policy-implementer has no more than a hazy idea of the different frameworks within which academics might legitimately pursue their entrepreneurial activities. Neither appeared aware of the difference between sabbaticals and leave of absence, neither had a clear idea

how academics obtained sabbaticals or leave of absence Kent's former policy-implementer, also recruited from industry, had a similarly hazy grasp of this aspect of university policy and procedure in this respect In the other six universities policy-implementers were better informed, but Durham's articulated the unambiguous view that if academics need time to pursue their business activities, it is not his responsibility to help arrange a legitimate framework - either on an *ad hoc* basis or as a matter of policy. In Liverpool the policy-implementer's failure to consider how the university could help academics to legitimately pursue their entrepreneurial interests within one time framework or another seems to be due to scepticism about the value of exploiting IP via spin-off companies established by academics, following the demise of ULTRA, the framework within which academics were expected to pursue their entrepreneurial interests. This is doubtless compounded by the fact that not one academic is known to have requested time off in order to set up a company. This probably explains why York has not addressed this question coherently, either, since the foundation of the university, only one academic there has requested leave of absence in order to legitimately devote time to setting up a company.

In universities where, for one reason or another, neither policy-maker nor policy-implementer has identified/created frameworks within which researchers could legitimately devote time to their business activities, would-be academic entrepreneurs face similar opportunities and strictures to colleagues seeking time off for other purposes, as far as can be gauged. In this respect, the two plate-glass universities are the most flexible, making a greater variety of frameworks available than the other seven, the two ex-CATs and two of the three civic universities are the least flexible, with the two "ancient" universities occupying the middle ground. The two plate-glass universities are also consistently the most generous in respect of the maximum length of free/partially free time which each

available framework offers would-be academic entrepreneurs. No other participating university can equal their generosity where sabbaticals and leave of absence are concerned, where part-time contracts are concerned, the two "ancient" universities, are as generous. When it comes to consultancy time, the generosity exhibited by the two plate-glass universities is the norm, rather than the exception, however, here, the two "ancient" universities - and Strathclyde - distinguish themselves by being significantly less generous than the norm. The two plate-glass universities - along with Strathclyde - are the most flexible/generous, once again, when it comes to the length of time by which previously agreed periods of leave of absence might be extended. As the composite indicator in respect of measure (s) confirms, there is a significant difference in attitude between the two plate-glass universities and the other seven participating institutions - a difference which, in part at least, accounts for Kent's surprisingly high score in the overall indicator of help given to academics with IP to exploit detailed in section 9.5. How should we explain this significant difference? Both universities are small. Both remarked spontaneously that they regard themselves as considerably less bureaucratic and more *laissez-faire* than most institutions. Both were founded in the "liberal" 1960s. Both were modelled to a considerable degree on Oxbridge, where lecturers' job specifications are notoriously vague. There may be other similarities. Suffice it to say that it seems likely this difference is linked in some way to university type, to ethos.

Let us look more closely now at the two universities where policy-makers have coherently and comprehensively considered all the forms of help for academics with IP to exploit detailed in this study and communicated their conclusions to policy-implementers - something which City can hardly avoid doing, given that policy-maker and policy-implementer are one and the same person. Despite this, neither institution has achieved particularly high scores in the overall indicator of help provided - nor is their position in

the resulting rank order particularly high. Why?

Judged by the composite indicators, City's provision is fairly uniform; the difference in the scores achieved for the various forms of help is not significant. City's low score in the composite indicator for measures (n)-(q) is due in part to not having a formal patent budget; the reasons for this have already been outlined. In part, too, the low score is due to City's practice of making a first call upon departments when it comes to paying for the cost of patent protection. Unlike York, where the policy-implementer may be obliged by financial constraints to do this, City's policy-maker/implementer does this as a matter of policy, despite the existence of the technological development fund. He believes that the centre should not hug such IP ventures to itself, but should offer departments the opportunity to participate, in return for a greater than usual share of the profits, if there are any. In other words, they, too, should be given the opportunity to "speculate to accumulate".

City's low score in the composite indicator for measure (s) is probably due to two factors. First, CATs seem to have had quite a different tradition to universities in respect of the amount of free time enjoyed by members of staff, there is evidence to suggest that their change of status has not had much impact on the provision of sabbaticals, for instance. Thus, there are fewer frameworks available to would-be academic entrepreneurs. Second, as indicated, City's policy-maker does not entirely concur with the approach adopted by this study in relation to providing help for would-be academic entrepreneurs. He believes that academics making a fairly substantial time commitment to their company should soon be asked to make a choice between academia and business, rather than try to meet the demands of both worlds.

City's score in the composite indicator for measure (u) gives it a slightly higher position in the resulting rank order than for the previous composite indicators; nonetheless, its score is still considerably lower than the target set by this study. City's location in central London and the resulting pressure on accommodation explains why it is not prepared to let academic entrepreneurs use additional accommodation, over and above their existing office and lab space. Its location also explains why it is less flexible than several participating universities when it comes to charging academic entrepreneurs for the use of physical/human resources. City feels that it is hard enough to recruit secretarial and technical support staff as it is, given the local cost of living in relation to university salary scales; it is therefore vital that such staff should be paid the full, market rate for any extra work they do for academics with spin-off companies.

Unlike City's, Strathclyde's provision is far from uniform, judged by the composite indicators; there is a significant difference in the scores achieved for the various forms of help. Help is geared more towards financial provision of one sort or another and less towards the provision of physical/human resources or frameworks within which academics may legitimately devote time to their business activities. It is no accident that Strathclyde puts so much emphasis on financial help of one sort or another. As indicated, it is university policy to ensure that as much technology as possible is transferred - by means of spin-off companies, where appropriate, this level of financial help is designed to oil the wheels as far as possible. Strathclyde makes a sharp distinction between financial help for companies co-founded by academics to exploit their research discoveries and other forms of financial help, available for any researcher with IP to exploit, the latter is taken from the university's UFC funding, the former is provided from the university's private funds

Strathclyde's approach to academic entrepreneurs using the university's physical/human resources is noticeably less generous than that of certain other participating universities, even though Strathclyde is not entirely alone in casting itself in the role of "midwife to enterprise". While some participating universities tend to interpret this in terms of featherbedding academics to a certain extent, especially in the start-up phase, Strathclyde sees it as vital that academic spin-off companies should not be featherbedded, even in the start-up phase. The phrase "*no hidden subsidies*" recurred time and time again in the course of interviews with the policy-implementer. He has two principal reasons for adopting this approach: firstly, he does not wish to provoke charges of unfair competition from rival, non-academic companies; secondly - and more importantly, he believes that venture capitalists will be more inclined to provide second-round and subsequent funding if they see that academic spin-off companies have confronted reality from day one. Thus, entrepreneurial academics are charged the full, market rate from day one. Strathclyde is particularly keen to do this where accommodation is concerned, it has gone to the trouble of co-founding a science park and, more recently, establishing an on-campus incubator unit located in the city centre. If academics are adamant that they would prefer to be located in conventional university accommodation and can justify that preference - and some can - they are charged commercial city centre rents. Strathclyde has an added incentive for doing this: it is extremely short of accommodation for its primary academic activities.

Strathclyde is also less flexible than many other participating universities in terms of the variety of frameworks within which academics could legitimately pursue their business activities. This has nothing to do with the fact that Strathclyde is a former CAT and may have fewer frameworks available than, say, plate-glass universities. Strathclyde's policy-implementer believes that entrepreneurs need to be able to devote the majority of their

time and energy to getting their company up and running. If they cannot do this - if they are trying to fulfil their usual academic commitments and think about the company in the evenings, at weekends, in their consultancy time and in the time garnered by, say, putting off assuming responsibility for departmental administration - he believes that both the company and the university are liable to suffer. In situations where academics are trying to exploit "hard" IP entrepreneurially, where the university is a partner, Strathclyde asks them to take around 70 per cent leave of absence for two or three years; both parties may terminate or extend the arrangement on the basis of a year's rolling notice. Strathclyde feels that it is beneficial to the academic and to his department to continue functioning as an academic for, say, 30 per cent of the time, the entrepreneur does not lose his academic identity entirely and the department does not entirely lose him as a resource.

CHAPTER 10

10 POLICY AND PRACTICE AS PERCEIVED BY HEADS OF DEPARTMENT AND DEANS: A CASE-BY-CASE AND CROSS-CASE ANALYSIS

10.1 Introduction

Towards the end of chapter 6 this investigation was characterised as one which employs a non-holistic, multiple-case design. That is to say, the investigation consists of a number of case studies, each of which involves multiple, embedded units of analysis, to use Yin's terminology (Yin, 1989). Like section 2 of the final four case study narratives, chapter 10 focusses on one of those embedded units of analysis: heads of department (HoDs) and deans. In keeping with the first section of the case study narratives, the second section systematically presents much of the data elicited in narrative form, the objective is to "tell the story" holistically and to make accessible a wealth of descriptive material. This is a worthwhile objective *per se*, however, the aim of this investigation is to begin to develop substantive theory - or, at least, some working hypotheses. The objective of chapter 10, therefore, is to analyse the data presented in the second section of the case study narratives and to identify categories, where appropriate, with a view to developing hypotheses - and, hopefully, to contribute to (embryonic) substantive theory.

Chapter 10 will be structured as follows. Section 10.2 will introduce the interviewees *en masse*. Although this flies in the face of the analytical logic outlined at the end of chapter 6, it was felt that to introduce the interviewees on a case-by-case basis would be certain to jeopardise their anonymity, particularly in the two smaller universities, Hull and York. Section 10.3 will be devoted to Hull, section 10.4 to Liverpool, section 10.5 to Strathclyde and section 10.6 to York. Section 10.7 is devoted to a comparison across all

four cases. It is the objective of this section to explore the extent to which there is cross-case replication in relation to HoDs' and Deans' awareness of and attitude to salient features of UK intellectual property law, to certain key events and to certain aspects of their university's policy *vis-a-vis* the identification, protection and exploitation of IP. This section will seek to establish whether any of the four cases are exceptional in any sense - and if so, why.

Consideration will be given in the final chapter, chapter 12, to the question of whether any replications or exceptions identified in the preceding section suggest any hypotheses or possibly embryonic substantive theory

10.2 Introducing the Interviewees

The 25 interviewees comprised 18 HoDs, a further three HoDs who were simultaneously Deans, plus four who at the time were exclusively Deans. The HoDs came from 14 different UGC cost centres, as Figure 71 shows, some cost centres were represented two or three times

Many of the informants had spent a long time at the university in which they were interviewed. The average was 16.44 years, an average which conceals a spread ranging from 26 to just 3 years. Interviewees at York exhibited the highest average (20.25 years), interviewees at Liverpool the lowest (14.88 years), Strathclyde had the second highest (16.71 years) and Hull the second lowest (15.66 years)

Despite the length of time spent at the university in which they were interviewed, only 10 of the 25 interviewees had pursued an exclusively academic career path. The other 15 had spent periods ranging from 2-12 years working in private practice, industry, the family

business or some other non-academic context - some in mid-career, some at the beginning of their careers, one had started life as an apprentice. Seven of the ten interviewees who had pursued an exclusively academic career had spent part of their working life abroad. one in Switzerland and six in the United States, one of these had spent the first 16 years of his career in three different universities in the United States. Thus, only three interviewees had pursued the supposedly "classic" career path of the British academic - working exclusively in British universities - and only one had graduated, obtained his PhD and worked all his life at the same university.

In 1985, when the BTG's right of first refusal was removed and the Kingman letter was despatched, all but two of the 25 interviewees were employed at the university in which they were interviewed. However, only 18 of them had been HoD/acting HoD at the time, coincidentally, those who had not been HoD/acting HoD were distributed remarkably evenly through the four universities. By 1989-90, when they were interviewed, all but two of the informants were Professors - nine of whom had originally attained this status by means of a personal Chair, two also had a DSc. One was about to become Deputy Vice-Chancellor, one had already been both a Pro-Vice-Chancellor and, briefly, Acting Vice-Chancellor. In short, most of the interviewees had been active, highly-esteemed researchers and were well-established, senior or very senior members of their university.

Case Analysis:
Hull University

10.3 Hull University

10.3.1 Removal of the BTG's Monopoly and Response to the Kingman Letter

As Figure 72a shows in tabular form, all six interviewees at Hull reported that they had been aware of the removal of the BTG's monopoly - whereas only four claimed to have been aware of the fact that the university had been offered the opportunity to assume rights and responsibilities previously enjoyed by the BTG. From the perspective of the Research Councils and the government, this is an encouraging finding, especially if one takes into account the fact that the university itself formally communicated this information to only one of the six interviewees.

The six were asked if they could remember when and how they had learned of these two key events. As Figure 72b shows, between them they reported a range of information sources, some internal, some external. Interestingly, three of them felt that they had learned about the removal of the BTG's monopoly from a university circular - which the university itself had no recollection of sending and of which no trace remains. This suggests that these particular interviewees' responses reflect their expectations concerning the dissemination of information in Hull, rather than what actually happened. In other words, from the perspective of this investigation their responses are tantamount to a comment on the university's usual propensity for and manner of disseminating information; as such, they have the effect of highlighting Hull's failure to disseminate this particular information. Only two of these three interviewees reported awareness of the Research Councils' offer - but, interestingly, neither suggested that a university circular was the source of this particular piece of information. Of course, we shall never know exactly how they did learn about these two events, but since they did not learn about them by design, through a dissemination exercise initiated by their university, we may reasonably assume that they learned about them by chance.

Questioned about their attitude to the removal of the BTG's monopoly and the Research Councils' offer, none of the interviewees who said they had been aware of these two events at the time reported that they had been against the idea of their university assuming rights and responsibilities previously enjoyed by the BTG. As Figure 73 shows, only one indicated that he had been indifferent to this idea, whereas three professed to have been in favour of it. Figure 74 details the reasons given by these four interviewees for the views they held. Efforts to group and characterise these reasons yielded two distinct categories. These particular interviewees explained their views in terms of

- * expertise,
- or
- * relevance.

As Figure 74 reveals, one interviewee explained his indifference in terms of not seeing this as a question which was relevant to his field/discipline, while two explained their support for the idea in terms of the perceived lack of expertise of the BTG *versus* the supposed expertise of his department. Asked why they thought that their university had decided to accept the Research Councils' offer, between them the six interviewees gave eleven reasons. As Figure 75 indicates, efforts to group and characterise these reasons yielded four distinct categories. These particular interviewees felt their university was motivated by:

- * financial gain,
- * perceptions of expertise,
- * furthering contact with industry;
- or
- * a desire for relevance.

Asked who they thought should have been involved in the decision-making process in relation to their university's response to the Research Councils' offer, most interviewees at Hull answered in terms of the status and/or function, group membership or perceived characteristics of the people they thought should have been involved. Accordingly, a

categorisation scheme was devised which accommodated these criteria. **Figure 76** categorises interviewees' responses to this question in terms of this scheme. One interviewee's response could not be categorised in this manner, he suggested that it did not matter who was involved in the decision-making process, since the outcome would be the same, in any case.

Noticeably, although the interviewees were asked who they thought should have been involved in the decision-making process, as **Figure 76** shows, interviewees at **Hull** gave their views on who they thought should have been involved in the consultation process, omitting (with one exception) to specify who they thought should have made the decision in the light of the results of that consultation process. At first sight, **Figure 76** gives the impression of a certain diversity of opinion on this subject. However, the categorisation scheme employed allows us to tease out common threads. For instance, all five respondents whose answer was categorisable in this manner felt that academics should have been involved in the consultation process - either representative academics defined by status/function or individual academics defined by perceived characteristics (experience of IPR) - or a combination of the two. Only three out of the five felt that an administrator defined by perceived characteristics (interest/expertise in IPR) should also have been involved in the consultation process, though a fourth felt that an entity with dual membership (*ie* both academic and administrative) should have been involved. Only one interviewee specified who should have been involved in the decision-making process, he felt that this question should have been jointly decided by an entity with dual membership (*ie* both academics and an administrator with interest/expertise in IPR).

This categorisation scheme also highlights the fact that most respondents felt that people

should be consulted about this question in their capacity as individuals, rather than as representatives/members of entities. Only one respondent felt that an entity of any sort should be involved - significantly an entity whose membership comprised both academics and administrators. This categorisation scheme also suggests that these particular interviewees felt that their university's response to the Kingman letter was something to be decided at the "middle management" level, rather than the senior management level - *ie* by those whom it would most affect and by those with experience. Certainly, the entity specified is a relatively junior entity, being a Sub-Committee of the Personnel Committee. The position of HoDs is more ambiguous, however. In 1985-86 HoDs had greater managerial responsibility than they did in 1989-90, when the interviews were conducted, in the meantime, much of that managerial responsibility has passed to the Deans. Although interviewees were asked to relate their answers to the period in question, it is impossible to gauge how successfully they managed to divorce themselves from the current system of academic management.

Finally, this categorisation scheme also highlights answers which interviewees did not give. It is striking that not one interviewee suggested that the ILO should have been involved in either the consultation or decision-making process - despite the fact that he had been appointed by that time.

10.3.2 Identifying Intellectual Property Generated by Academics

The interviewees were asked a series of questions designed to elicit their views on the context in which commercially exploitable IP might be generated in a university. As **Figure 77** shows, five out of the six interviewees at Hull felt that certain science or engineering disciplines were more - or less - likely than others to generate commercially exploitable IP, though one qualified his answer, remarking that this was a matter of fact.

rather than potential When asked which disciplines they had in mind, between them these respondents nominated just two disciplines which they felt were less likely to generate commercially exploitable IP However, as Figure 78 shows, they were even less informative about the disciplines which they felt were more likely to do so, preferring to categorise them as "the hard sciences" or "applied disciplines". It is difficult to escape the conclusion that these interviewees had never devoted much time to consideration of this question, that their answers represented a "gut feeling" rather than a reasoned response

Only one interviewee thought that no disciplines were more or less likely to generate commercially exploitable IP, instead, as Figure 79 reveals, he felt that the generation of commercially exploitable IP depended on a university having sound physics and chemistry departments, since these two disciplines formed "the basis of all science"

Effectively, the interviewees at Hull divided into two distinct groups five who felt that the generation of commercially exploitable IP was a "given", a function of the discipline, and one who felt that it was dependent on the appropriate infrastructure being in place - viz a sound physics and chemistry departments It is worth noting that in the course of being interviewed, this particular informant made numerous references to the demise of Hull's two physics departments (pure and applied) and the eventual emergence of a single - in his view, rather weak - Department of Applied Physics He blamed it in large part on the refusal of the two HoDs - supposedly on grounds of ego - to help reduce Hull's financial problems by merging the two departments This was clearly an episode on Hull's recent history which disturbed him considerably and it may be more appropriate to regard his response as one which is driven by his "hobby-horse" rather than an objective answer to the question which was posed

The interviewees were then asked how aware they thought that members of their own staff were of their university's wish to identify commercially exploitable IP. Their answers, interpreted in terms of a five-point scale, are presented in tabular form in Figure 80. It is acknowledged that attempting to interpret the reasons they gave in this manner is a fairly hit-and-miss approach, particularly where the three middle points are concerned ⁽¹⁾. The table is offered as an indication of the interviewees' impressions of awareness levels, rather than an indication of their staff's actual levels of awareness. As Figure 80 shows, most of the interviewees at Hull had the impression that levels of awareness among their staff were neither particularly low nor particularly high.

Four of the six interviewees spontaneously suggested why awareness levels were as they characterised them. The reasons they gave were sufficiently diverse as to defy reduction into fewer than four categories. Accordingly, as Figure 81 shows, levels of awareness in these departments at Hull may be attributable to.

- * the orientation of members of staff,
- * the perceived relevance of their research ;
- * the amount of publicity given to the subject,
- or * the amount of controversy stirred up by the University's wishes in this respect

Next, the interviewees were asked whether, in view of the ratio of IL staff to academic staff, they thought the staff in their department/faculty would take a positive or a negative view of being asked to "flag" IP which they thought might have the potential for exploitation. Their answers, interpreted in terms of a five-point scale, are presented in tabular form in Figure 82 ⁽²⁾. Again, this table is offered as an indication of the interviewees' impressions of staff attitudes, rather than an indication of their staff's actual

attitudes. As **Figure 82** shows, five of the six interviewees at **Hull** had the impression that the attitude of their staff would be positive or, more commonly, very positive, only one had the impression that the attitude of his staff would be neutral

The interviewees were then asked whether they thought that the centre, perhaps through the IL office, should take a proactive or a reactive approach to trying to identify potentially exploitable IP - *ie* should the university rely exclusively on members of staff coming forward and "flagging" IP opportunities or should it try to ferret out IP which academics might have overlooked or been too busy or too disinterested to "flag"? As we can see from **Figure 83**, the attitudes of interviewees from **Hull** tended to polarise, interviewees either felt that a proactive approach was what was required, or they thought a reactive approach was more appropriate, only one interviewee opted for an approach which was midway between the two

Finally, the interviewees were asked to consider two systematic "fail-safe" mechanisms which might be employed - scrutinising research projects at the proposal and/or interim/final report stage and scrutinising drafts of papers before submission to journals. As we can see from **Figure 84**, where scrutinising research projects at the proposal and interim/final report stages was concerned, interviewees at **Hull** divided into two, polarised groups. Half were in favour of having proposals scrutinised, half were not, four were in favour of having interim/final reports scrutinised, while two were against the idea. Where scrutinising drafts of papers was concerned, there was greater consensus, however. All but one of the interviewees was firmly against the idea. When asked to explain why they took these views, those who were against this kind of scrutiny cited a number of reasons. These seemed to fall into three distinct categories. As **Figure 85** shows, these particular interviewees felt that this kind of scrutiny would

- * require greater expertise than was available,
- * take too much time,
- or * be of dubious cost/benefit

10.3.3 Ownership of Intellectual Property Generated by Academics

It was explained to the interviewees that the 1977 Patent Act rules on the ownership of employee inventions, as does the 1988 Copyright, Designs and Patent Act on the ownership of copyright material created by employees. They were told that in Britain academics appear to be treated by IP law in the same way as any other employee the intellectual property they generate belongs to their employer unless it is unrelated to their work. The interviewees were also told that in a number of other industrial nations, IP laws specifically exclude academics from the employee ownership provisions They were then asked which they thought was the more appropriate

The interviewees tended not to respond quickly to this question, for some it was clearly unfamiliar territory and they required time to digest the question, ask supplementary questions and double-check that they had understood the answers before formulating their own answer. As Figure 86 reveals, at the end of this clarification process, the six interviewees at Hull came to quite divergent conclusions Two felt the IP should belong to the university, while another two thought it should belong to the academic(s) who generated it One felt it was immaterial since the outcome would be the same, whoever owned it Another suggested that joint ownership seemed the most appropriate approach The awkward, hesitant phraseology employed by this last interviewee suggests that he had not previously encountered the concept, but had devised it himself, certainly, none of the interviewees at Hull gave any sign that they were aware that joint ownership was, in fact, their university's stated policy

There was no obvious pattern to these interviewees' judgements regarding the ownership of IP generated by academics. For instance, those who had worked in industry for a period did not necessarily espouse the view that IP should belong to the employer, conversely, those who had had an exclusively academic career did not necessarily espouse the view that the IP should belong to the academic(s) who generated it. When asked why they held the view which they had articulated, the reason(s) they cited varied considerably. Attempts to categorise these reasons yielded almost as many categories as reasons given. Essentially, as Figure 87 shows, these particular interviewees from Hull explained their views on the ownership of IP in terms of

- * provision of the necessary infrastructure,
- * the locus of direction in academic research,
- * each party's potential to exploit,
- * considerations of staff motivation,
- * the mission of the professions to render service,
- or * the inconsequence of either party owning it

10.3.4 Protecting Intellectual Property Generated by Academics

The interviewees were asked whether they agreed with the broad concept of "protecting" IP where academic research discoveries were concerned. In several instances, it proved necessary to explain what was meant by "protecting" IP, since the interviewees in question were not familiar with the terminology. As Figure 88 shows, once they understood the meaning of the question, five interviewees at Hull said that they were in favour of the broad concept, whereas one indicated that he was uneasy about it. Four interviewees gave reasons for the views they expressed. As we can see from Figure 89, these fall into two distinct categories. Support for the broad concept of "protecting" inventions was explained by these particular interviewees from Hull in terms of

- * the anticipated financial gain,

while uneasiness was explained in terms of:

- * blurred boundaries between fundamental, strategic and applied research results.

Next, the interviewees were told that, as employers UK universities are under no legal obligation to file a patent application on inventions generated by academics; they can choose to "protect" it by treating it as secret know-how. They were then asked how they felt about treating academic research discoveries as secret know-how. It became clear from the ensuing discussion that most of these interviewees had no idea that if they notified their university of potentially exploitable IP, the university had the legal right to insist that it should be "protected" by keeping it secret. One became very concerned about the fact that the law allowed universities to do this. None of the interviewees at **Hull** agreed without reservation with the idea of treating academic research discoveries as secret know-how, and four disagreed completely. Asked why they disagreed, the four each cited one reason. As **Figure 91** reveals, their reasons fall into two distinct categories. These particular interviewees at **Hull** explained their antipathy towards secret know-how as a form of "protection" in terms of:

- * the proper function of a university;
- or
- * practical difficulties entailed in secrecy.

As we can see from **Figure 92**, just two interviewees at **Hull** accepted the idea of treating academic research discoveries as secret know-how - provided certain conditions were fulfilled. One felt that if the university was trying to "protect" a process, secret know-how might make sense, whereas it was unlikely to where any other type of invention was concerned. The other thought that the university should be selective in exercising its rights

in this manner - doing so only where there was significant commercial advantage in emulating a company We might categorise both these conditions as

- * product-centred.

Asked whether they thought that patenting or secret know-how as a means of "protecting" inventions was preferable, five out of the six interviewees at Hull said they thought that patenting was preferable, as Figure 92 indicates.

In view of the fact that UK universities are under no legal obligation to file a patent application on inventions generated by academics, that they can choose to "protect" it by treating it as secret know-how, the interviewees were next asked who exactly had the right to decide whether and how to protect IP generated by academics at Hull As Figure 93 shows, only one was aware of the university's policy on this, the other five neither knew nor felt able to hazard a guess. Upon learning that it was the university's policy to let the academics themselves decide, as Figure 94 reveals, all six said that they agreed with this policy Four explained why; as Figure 95 shows, the reasons they gave fell into three distinct categories These particular interviewees from Hull explained their attitude university policy in terms of.

- * academic freedom,
 - * opportunity costs;
- or
- * pragmatic considerations

It is interesting to compare interviewees' opinions on questions like who should make the final decision about whether and how to "protect" IP and whether inventions should be "protected" by treating them as secret know-how with their opinions on who should own IP generated by academics As we have seen, two of the six said they felt that the university should own such IP, however, both agreed with the university's policy of

allowing the academic(s) concerned to make the final decision about whether and how to "protect" this IP; at the same time, one of them was against the idea of "protecting" IP by treating it as secret know-how and the other was prepared to accept it only under certain circumstances. The two who thought that academics should own the IP they generate agreed with university's policy of allowing the academic(s) concerned to make the final decision about whether and how to "protect" it, on the other hand, both were against the idea of "protecting" IP by treating it as secret know-how. The interviewee who advocated joint ownership of IP nonetheless agreed with the university's policy of allowing the academics concerned to make the final decision about whether and how to exploit such IP - but was firmly against the idea of "protecting" it by treating it as secret know-how.

The interviewees were next asked a series of questions designed to explore their attitude to the logistics of "protecting" IP by patent. They were informed that it was Hull's policy for the academic(s) who generated the IP to write the patent specification themselves, and that they were unlikely to receive any help from a patent agent unless the patent was particularly complex. This information was received without comment by four interviewees; however, two queried whether the university - in particular, the IL office - could not do something to reduce the contribution required from academic(s). The interviewees were then asked how they would respond to a member of their staff who asked for a temporary reduction in his/her workload, in order to concentrate on writing the patent specification. As Figure 96 shows, three interviewees at Hull were not prepared to entertain the idea, whereas two were prepared to consider it and one said that he certainly would do something to help anyone on his staff who was trying to write a patent specification. Each interviewee was asked what made him respond in the way he had. The reasons given are detailed in Figure 97. Efforts to group and characterise them yielded four categories. These particular interviewees from Hull explained their attitude to

temporarily reducing the workload of a member of staff in terms of

- * the perceived cost/benefit,
 - * the nature of the task,
 - * departmental flexibility,
- or
- * practical considerations

It is interesting to compare the extent of these interviewees' preparedness to help members of staff writing patent specifications with their views on the ownership. We might have expected those who felt that ownership should be vested in the academic(s) who generated the IP to be less prepared to help than those who felt that ownership should be vested in the university. However, there is no such association, indeed, there appears to be no pattern at all to interviewees' attitudes.

10.3.5 Entrepreneurially Exploiting Intellectual Property Generated by Academics

The interviewees were asked a series of questions to elicit their views on entrepreneurially exploiting "hard" IP generated by academics, instead of routinely licensing or assigning it to an existing company. This proved to be one of the more difficult sections of Questionnaire C (and the pilot questionnaire) to administer and it is correspondingly difficult to analyse. Every interviewee at Hull based his opinions on "knowledge" of actual spin-off companies - usually companies which had spun out of the university; that is to say, none of them was speaking hypothetically. However, it was common to find - often after fairly lengthy discussion - that interviewees' views were based on mistaken assumptions concerning such companies. So, for example, the views they expressed in relation to university companies were based on assumptions concerning a company which was actually a joint venture, or their views on joint ventures were based on a company which was actually an independent academic spin-off company, or a company which they

thought was exploiting "hard" IP was actually exploiting "soft" IP *etc etc* The interviewer became so concerned to establish what kind of entrepreneurial scenario they were actually talking about that on occasion she paid insufficient attention to ascertaining their attitude to the entrepreneurial scenario she had asked about, or insufficient attention to ascertaining the reasons for their attitude - particularly their reasons for approval/qualified approval for entrepreneurial exploitation of "hard" IP *per se* As a result, the investigator has less confidence in the attitudes detailed in Figure 99 than she would wish; in some cases, it is possible that an attitude expressed by an interviewee related to a different entrepreneurial scenario to the one to which it appears to relate in the transcription. For this reason, the investigator made no systematic attempt to relate the reasons they gave for their attitudes to a particular entrepreneurial scenario, preferring to analyse the reasons as a group.

It is noticeable that these particular interviewees from Hull volunteered twice as many caveats and concerns concerning the various entrepreneurial scenarios they were asked about as they did reasons for supporting any of them Upon examination, the reasons they gave appeared to fall into eight fairly distinct categories, though there was some debate about which category was most appropriate to two or three reasons This may suggest that some categories could be conflated, or that in some cases the underlying concepts embodied by these categories have not been characterised as accurately as they might be, we shall return to this question later. In the meantime, we may tentatively posit that these particular interviewees from Hull explained their views on the various entrepreneurial scenarios in terms of

- * the founding initiative,
 - * their perceived fitness for the task,
 - * their perceived value as a technology transfer mechanism,
 - * the income they were thought to generate;
 - * the perceived blurring of the divide between academia and industry;
 - * role models,
 - * academic salary levels,
 - * issues related to control,
 - * their modus operandi,
- and/or *
- * their cost/benefit,

as detailed in Figure 100

Next, the interviewees were asked for their views on three mechanisms by which academics could exploit "soft" IP: personal consultancy, commercial arms of departments and spin-off companies. As Figure 101 shows, these particular interviewees from Hull felt that extensive consultancy was definitely not an "inert" activity. Five out of the six thought it would have a negative impact, on the other hand, four said that it could also have a positive impact. Asked to give examples of the kind of positive or negative impact which extensive consultancy might have, each interviewee cited at least one. As we can see from Figure 102, the examples they gave seem to fall into five categories. These particular interviewees from Hull felt that extensive consultancy would have an affect on:

- * the academic's students,
 - * the academic's research,
 - * the academic's administrative load,
 - * the academic's motivation,
- and/or *
- * bridging the divide between academics and industry

Of course, this is just one set of possible categories for the examples given by these interviewees. We might equally have employed the categories individual, collective and wider community to group them. If we had, we should have observed that of the 15 examples given, only two were concerned with the impact of extensive consultancy on the *individual* academic, at least nine were concerned with its impact on the academic *collective*, though a further five could be categorised as concerned with both the academic *collective* and the wider community, just two were concerned exclusively with the impact of extensive consultancy on the wider community.

The interviewees were also asked whether they agreed with their university's policy regarding the amount of time per week/month/year members of staff were allowed to devote to personal consultancy. As Figure 103 shows, although at the time Hull imposed no time limit, two interviewees thought there should be a time limit and another felt there should at least be a guideline in this respect. None suggested what the time limit/guideline should be, though one volunteered the information that he did not allow his staff to devote any time to personal consultancy during the hours of 9-5, Monday to Friday, staff were not prevented from doing in-house consultancy during these hours, however.

Next, the interviewees were asked a series of questions designed to elicit their views on staff exploiting "soft" IP via a commercial arm of the department. Only two of the six interviewees reported that a commercial arm had been established in their department - both during the "entrepreneurial" 1980s. As Figure 104 shows, there were significant differences between the two - in terms of the locus of the initiative to found them, the extent to which they had a physical as opposed to a notional reality, their financial *modus operandi* and the parties who financially benefitted from their activities.

Notwithstanding these differences, in both cases the host department perceived there to be benefits other than direct financial benefits arising from the activities of the commercial arm. As Figure 105 shows, we might categorise those they mentioned as

- * more effective usage of staff time,
- * providing a resource for colleagues from other departments,
- * advancing the discipline,
- and * helping industry

The four HoDs whose departments had no commercial arm were asked why none had been established. As we can see from Figure 106, we might categorise the reasons they gave as

- * the expense,
- * the risk,
- * the effort required,
- * the existence of a competitor,
- and * concern about control

Where exploitation of "soft" IP by means of a company of one sort or another is concerned, it is clear that the pilot questionnaire was less adequate at distinguishing between interviewees' views on wholly-owned university companies, joint ventures and independent academic spin-off companies than the investigator would have wished in retrospect. This omission was not redressed as well as it might have been in the revised questionnaire which was administered to two of the six interviewees at Hull. Interviewees were simply asked whether they made a distinction - when formulating their views on the various entrepreneurial scenarios - between academics who founded or were involved with "hard" companies and those who founded or were involved in "soft" companies. Given

that the data on interviewees' views of academics founding or becoming involved in various types of "hard" companies are of questionable value, this is not the most helpful approach to the problem. Suffice it to say that only one interviewee addressed this question - and in his opinion there were no grounds for distinguishing between academics who founded or were involved in "hard" companies and those who founded or became involved in "soft" companies.

10.3.6 Support for Entrepreneurial Academics

The interviewees were asked a series of questions designed to ascertain the extent to which would-be academic entrepreneurs in their department might be given practical support to help them in their entrepreneurial endeavours

This analysis will focus on time, since arguable this is the key form of support for would-be academic entrepreneurs, moreover, use of equipment, instrumentation, secretarial or technical support staff are all forms of support which departments are used to providing in the context of personal consultancy, while the use of communications is almost automatic, although the basis for payment may vary. The pilot questionnaire focussed initially on three different mechanisms for giving would-be academic entrepreneurs time to devote to business start-up

- i) a formal reduction in or rescheduling of the academic's normal workload for a limited period,
- ii) a part-time contract for a limited period,
- iii) complete leave of absence for a limited period

It was the university's policy to leave to the discretion of the relevant Dean the amount of time which academics might devote to entrepreneurial activities. It is unlikely, however,

that approval would be granted if the academic's HoD did not support the proposal. As Figure 107 shows, there appear to be considerable discrepancies in the approach of these particular HoDs from Hull. At the time the interviews were conducted, would-be academic entrepreneurs in three departments could have been sure of persuading their HoD to temporarily reduce or reschedule some of their primary academic commitments while they strove to start their company; their *confreres* in another department might have been able to persuade their HoD to provide the same kind of support, if certain conditions were fulfilled, but in two departments requests for this kind of support would probably have been flatly rejected. In principle, at least, there was more of a consensus concerning temporary part-time contracts or complete leave of absence for an agreed period as mechanisms for giving would-be academic entrepreneurs time to devote to their business activities, in practice, however, discrepancies emerged once more. While entrepreneurial academics in two departments could have been sure of persuading their HoD to back proposals for a part-time contract or leave of absence for a limited period, their colleagues in another department could not have done so, and those in the remaining three departments could not count on doing so, either.

On the face of it, this would appear to be a fairly significant finding. It suggests that effectively HoDs in some science or engineering departments would either inhibit staff from founding/co-founding a company to entrepreneurially exploit IP arising from their research or, at the very least, inhibit the rapid growth of the company by limiting the time which the would-be academic entrepreneur could devote to it. In the same way, they would also inhibit the growth of wholly-owned university companies, set up to exploit IP generated by a member of their staff. Since HoDs at Hull seem to hold office indefinitely - or certainly, those who were interviewed had no fixed term of office, this is not a "temporary blip", a situation which might resolve itself when someone else takes a

turn at being HoD. It is therefore important to examine the reasons given by these HoDs for not being prepared to create a window of time for academics to devote to business start-up by employing certain mechanisms. We need to establish whether they are subjective or objective - a matter of the HoD's idiosyncratic *Weltanschauung*, perhaps, or a matter of obstacles, surmountable or insurmountable. Similarly, it is important to examine the conditions imposed by some HoDs, which, if fulfilled, would tip the balance in favour of the would-be academic entrepreneur.

The two HoDs who flatly rejected the idea of reducing or rescheduling a would-be academic entrepreneur's normal workload for a limited period both cited reasons which we may categorise as logistical. One felt it would be impossible logistically, while the other said it would create enormous problems. The HoD who conceded that he might possibly temporarily reduce or reschedule a would-be academic entrepreneur's normal workload made his support conditional upon the academic concerned obtaining - by one means or another - sufficient funds to permit the department to pay for teaching cover. The HoD who rejected the idea of a part-time contract or complete leave of absence for an agreed period did so because he believed that the department would not be allowed to keep the salary savings and use them to pay for teaching cover. One of the three HoDs who conceded that they might support an application for a part-time contract or complete leave of absence for an agreed period also made his support conditional upon being allowed to keep the salary savings and use them to pay for teaching cover. The other two had different concerns. One said his support for applications for a part-time contract or complete leave of absence for the purpose of business start-up would be time-limited (neither should last longer than one term) - and he would require one year's notice to allow him to reschedule optional courses in the curriculum. The second made his support conditional upon the nature of the business: there should be a likelihood of business.

success and academic career development simultaneously He felt that the ILO should judge the former, while he would judge the latter

It is difficult to evaluate claims that temporarily reducing or rescheduling a would-be academic entrepreneur's normal workload is out of the question on logistical grounds. This may be a statement of fact, or it may be symptomatic of a HoD who does not subscribe to the motto "Where there is a will there is a way", or it may be symptomatic of the morale of the department concerned, or a relatively non-flexible way of working If it is a statement of fact, this is clearly an objective, inhibiting factor which is department-specific and may only disappear in time - though equally it may become reinforced if the pressures on staff increase rather than diminish If it is symptomatic of the HoD's *Weltanschauung*, this is also an inhibiting factor which is department-specific and should disappear in time, once he relinquishes office On the other hand, it is a subjective obstacle rather than an objective one, and may be amenable to persuasion on the part of key figures in the university - if they are so minded If it is symptomatic of the morale of the department or a relatively inflexible way of working, this may be more difficult to overcome.

Where salary savings and teaching cover are concerned, we are clearly dealing with ignorance, it is worrying to discover that two out of the six HoDs did not know that under Hull's new system of devolved budgets departments were guaranteed to keep any salary savings they made and were free to use them to pay for teaching cover if they chose to. It is not clear whether this ignorance stems from inattention on the part of the HoDs or a failure on the part of the university to publicise the new system effectively

Where support is dependent on the likelihood of the proposed business succeeding, we are

clearly dealing with naivety, distinguishing viable from non-viable business plans is a skill which the ILO was unlikely to have - and even if he had, there is, of course, no guarantee that the most viable business plan on paper will translate in practice into success. Finally, it is not unreasonable for a HoD to request some notice of a would-be academic entrepreneur's intentions to change to a part-time contract or take complete leave of absence. However, the requirement that a year's notice be given in order to rearrange student options suggests that the nature of the curriculum may impinge upon would-be academic entrepreneurs' chances of being given a window of time to devote to business start-up. In other words, departments which have moved towards a modular approach to course delivery may be more flexible in this respect than departments which have retained a traditional curriculum structure. Since there is evidence of increasing moves towards modularisation, this potential obstacle to creating a window of time for entrepreneurial academics may disappear eventually in the departments which follow this trend.

10.3.7 Incentives and Disincentives

The interviewees were asked a series of questions designed to ascertain their awareness of various incentives and disincentives operating at Hull in relation to the exploitation of IP, and their attitude to the incentives and disincentives in question.

Let us look first at the exploitation of "soft" IP via personal consultancy - focussing initially on the way the university treated the income earned by academics in the process. As chapter 8 revealed, during the 1989-90 session, when the interviews were conducted, Hull had an earnings limit, if academics earned more than 25 per cent of their gross salary from personal consultancy, they were supposed to covenant the surplus to the university. At the start of the 1990-91 session, however, Hull planned to charge academics a £125 flat-rate fee for every day which they devoted to personal consultancy,

upto a maximum of 45 days per year - notwithstanding the fact that personal consultancy may be a form of technology transfer As Figure 108 shows, it is difficult to gauge the extent to which the six interviewees were aware of Hull's former approach, since - with regard to earnings limits in particular - an unusually high proportion of data is missing This results chiefly from the fact that the pilot version of Questionnaire C did not incorporate the necessary questions Unfortunately, Figure 109 does not record all six interviewees' attitude(s) to Hull's approach to income earned by academics from personal consultancy, either However, it shows us that those who expressed an opinion were against both the earnings limit and the levy on income earned through personal consultancy

Figure 110 details the reasons given by four interviewees for their stated attitude to the idea that the university should take a cut of the income earned by academics from personal consultancy. Efforts to group and characterise these reasons were not entirely successful, each appeared to constitute a different category. These particular interviewees were against the university taking a cut of academics' consultancy income on grounds of

- * the absence of a quid pro quo,
- * the relationship between consultancy and the department's remit,
- * the career development aspect of consultancy,
- or * staff motivation

Let us look now at the impact of personal consultancy on promotion at Hull As was mentioned in chapter 8, Hull claimed that not long before the 1989-90 session it had started to treat activities such as personal consultancy as factors which should be taken into account when considering applications for promotion - though this was not formally articulated anywhere Figure 111 shows that only one of the six interviewees was unaware

of this change, one was only semi-aware, but four claimed to be aware. However, Figure 111 also shows that none of them believed that this change was likely to be implemented in practice. Four were uncertain what to believe, while one felt it was unlikely to be implemented.

Interestingly, as we can see from Figure 112, all six interviewees felt that personal consultancy should be one of the factors taken into account when considering applications for promotion. Figure 113 details the reasons they gave for this unanimous view. Attempts to group and characterise those reasons yielded three categories. These particular interviewees felt that personal consultancy should be one of the factors taken into account on grounds of it being

- * a bridge to industry,
- * an appropriate activity;
- or * appropriate in a holistic approach to promotion

Let us turn now to the exploitation of "hard" IP by licensing/assigning it to one or more existing companies. Figure 114 shows the extent to which the six interviewees were aware of the university's policy *vis-a-vis* the distribution of income from the exploitation of IP. As we can see, none was fully *au fait* with the details of the sliding scales, but at least five were aware that the university had instituted formulae for the distribution of such income. Once they had been given details of the sliding scales, the interviewees were asked how effective an incentive they felt these were. We can see from Figure 115 that none of them was confident that the sharing of royalties, option fees *etc* constituted an effective incentive in the sense that it would encourage members of staff to "flag" potentially exploitable IP. One went so far as to characterise it as an ineffective

incentive, while another four were either ambivalent or uncertain about this. Figure 116 details the reasons given by these interviewees for their views on the effectiveness of income sharing as an incentive. Efforts to group and characterise those reasons yielded the following five categories. Four of these particular Deans and/or HoDs were ambivalent or uncertain about this because they felt that income sharing

- * conflicted with other policies;
- * was a purely hypothetical reward,
- * required extra effort, but . .
- * caused concern about [the] beneficiaries,

while the fifth felt that it was:

- * a comparative disincentive

Let us look now at the impact of patents, licenses *etc* on promotion. As chapter 8 revealed, Hull claimed that not long before the 1989-90 session it had started to treat signs of activity such as patents, licenses *etc* as factors which should be taken into account when considering applications for promotion - though this was not formally articulated anywhere. Figure 117 shows that at least one of the six interviewees was unaware of this, while another was only semi-aware; at least half were aware of this change, however.

Figure 117 also shows that it is not possible to gauge these interviewees' beliefs concerning the likelihood of this policy actually being implemented, since a high proportion of data is regrettably missing. However, Figure 118 indicates the interviewees' own attitude to the impact of patents, licenses *etc* on promotion. As we can see, four felt

that these should number among the factors taken into account, while one was ambivalent about this **Figure 119** details the reasons given by these four for this view and as we can see, efforts to group and characterise them yielded three categories. These particular Deans and HoDs felt that patents, licenses *etc* should number among the factors taken into account for promotion on the grounds of.

- * their income generation potential,
- * the value placed on patents *etc* by the UGC,
- or * the need to reward the outcomes of research, too.

Let us turn now to the entrepreneurial exploitation of IP - whether the IP in question is "hard" or "soft" Chapter 7 revealed that Hull's Registrar was aware of the "route 128 phenomenon" in the US, having read Bullock (1983), and that he was supportive *in principle* of efforts by academic staff to try to contribute towards the creation of a critical mass of small, high-technology businesses in Humberside *In practice*, however, as chapter 8 indicated, Hull has recently undergone a considerable change of approach *vis-a-vis* the income earned by academics from the entrepreneurial exploitation of IP - *eg* from director's fees, dividends, sale of shares or selling on the company itself *etc* Prior to the 1990-91 session, Hull did not expect a percentage cut of academics' personal income from the entrepreneurial exploitation of IP. From 1990-91, however, academic entrepreneurs were liable to be charged a flat-rate fee of £125 for every day they devoted to their entrepreneurial activities. As **Figure 120** shows, it is difficult to gauge the extent to which the six interviewees were aware of Hull's former approach, since an unusually high proportion of data is missing. This results chiefly from the fact that in the pilot version of Questionnaire C interviewees were told what their university's approach was, rather than asked whether they were aware of it. This was transformed into a question in the revised version of Questionnaire C, however, which was administered to just two of the

interviewees felt that this should number among the factors taken into account. **Figure 125** details the reasons given by four for their view. Efforts to group and characterise them yielded four categories. These particular interviewees felt that the entrepreneurial exploitation of IP should count towards promotion on grounds of it being.

- * an appropriate skill;
- * a sign of ability;
- * a reward for strengths,
- or * a benefit to the university

Case Analysis:
Liverpool University

10.4 Liverpool University

10.4.1 Removal of the BTG's Monopoly and Response to the Kingman Letter

As Figure 72a shows, only six of the eight interviewees at Liverpool reported that they had been aware of the removal of the BTG's monopoly; the same six claimed to have been aware of the fact that the university had been offered the opportunity to assume rights and responsibilities previously enjoyed by the BTG. From the perspective of the Research Councils and the government, this is not an especially encouraging finding, particularly if one takes into account the fact that the university itself communicated both pieces of information by a variety of mechanisms, including a personally-addressed letter to every member of staff in the Faculties of Engineering, Medicine, Science and Veterinary Science, from which these interviewees were drawn. However, one of the two who were unaware of either event was appointed after 1985-86 and was an external appointment in the most extreme sense, for he had not been part of the UK university system for many years prior to his appointment. This interviewee seems to have slipped with ease through Liverpool's loose system of informing new members of staff of these two events.

The six were asked if they could remember when and how they had learned of these two key events. As Figure 72b shows, despite Liverpool's best efforts, only one of them remembered receiving a personally-addressed letter and none of them remembered reading about it in the university newsletter. One recollected that he had received a letter on this subject from the SERC, while the other four had no idea how they had come by this information.

Questioned about their attitude to the removal of the BTG's monopoly and the Research Councils' offer, none of the six interviewees who said they had been aware of these two events at the time reported that they had been against the idea of their university assuming

rights and responsibilities previously enjoyed by the BTG As Figure 73 shows, none admitted to having been indifferent to this idea, either; in fact, all six claimed to have been in favour of it. Efforts to group and characterise the reasons which these interviewees gave for their attitude yielded two distinct categories These particular interviewees explained their attitude in terms of:

- * relevance,
- or * expertise

As Figure 126 reveals, four interviewees were supportive of the university assuming rights and responsibilities previously enjoyed by the BTG because they felt this would lead to Liverpool becoming increasingly relevant to the needs of industry/commerce The other two explained their support in terms of belief or knowledge that the BTG had been found to be lacking when it came to exploiting IP arising out of academic research

Asked why they thought that their university had decided to accept the Research Councils' offer, the eight interviewees gave only one reason each As Figure 127 indicates, efforts to group and characterise those reasons yielded four distinct categories These particular interviewees felt that the university was motivated by

- * financial gain;
- * perceptions of expertise,
- or * a desire for relevance

Asked who they thought should have been involved in the decision-making process in relation to their university's response to the Research Councils' offer, most interviewees at Liverpool answered in terms of the status and/or function, group membership or perceived characteristics of the people they thought should have been involved.

Accordingly, a categorisation scheme was devised which accommodated these criteria

Figure 128 categorises interviewees' responses to this question in terms of this scheme.

Noticeably, although the interviewees were asked who they thought should have been involved in the decision-making process, as **Figure 128** shows, all the interviewees at **Liverpool** gave their views on who they thought should have been involved in the consultation process, omitting (with two exceptions) to specify who they thought should have made the decision in the light of the results of that consultation process

Figure 128 suggests considerable diversity of opinion on this subject. However, the categorisation scheme employed allows us to tease out certain common threads. For instance, half the interviewees felt that only academics should be involved in the consultation process. These particular interviewees defined the academics in question in terms of what they represented or perceived characteristics (experience of IPR) - or a combination of these. Another felt that only representatives of academic entities and individual academics with dual status (*ie* both academic and executive) should be involved in the consultation process. Only two interviewees felt that individual administrators - defined by status or by function - should have been involved in this process, and one of those felt that an entity with dual-membership (*ie* both academic and administrative) should have been co-involved. When it came to the decision-making process, however, there was less of a consensus between the two respondents who addressed this question. One felt that this was a matter for an academic entity to decide, another felt it should be decided by an individual with dual status (*ie* both academic and executive) and by an individual administrator.

This categorisation scheme also enables us to tease out the fact that, as a group, these particular interviewees opted for balance between entities and individuals participating in the consultation process. Three interviewees felt that formally recognised entities should participate in the consultation process, while another three thought that academics representing entities should be involved and a third group of three felt that people acting in their capacity as individuals should be involved. When it came to the decision-making process, however, the interviewees who addressed themselves to this question nominated either entities or representatives of entities, rather than people participating in their capacity as individuals. This categorisation scheme suggests, too, that where the consultation process was concerned, most of these interviewees felt that their university's response to the Kingman letter was something to be decided at the "middle management" level, rather than the senior management level. However, when it came to the decision-making process, the interviewees who addressed this question seemed to regard this as a matter for senior rather than middle management to decide.

10.4.2 Identifying Intellectual Property Generated by Academics

The interviewees were asked a series of questions designed to elicit their views on the context in which commercially exploitable IP might be generated in a university. As Figure 77 shows, half of the interviewees at Liverpool felt that certain science or engineering disciplines were more - or less - likely than others to generate commercially exploitable IP. When asked which disciplines they had in mind, none of these respondents cited disciplines which they felt were less likely to generate commercially exploitable IP; and as Figure 78 shows, between them they listed just three disciplines which they felt were more likely to do so.

The other half of the interviewees thought that no disciplines were more or less likely to generate commercially exploitable IP; instead, they felt that the generation of commercially exploitable IP depended on a number of factors. Analysis of the criteria listed in Figure 79 suggests that these interviewees regarded the generation of commercially exploitable IP either as a function of certain characteristics of individual members of staff or as a function of certain characteristics of the university as a whole.

Effectively, then, the interviewees at Liverpool divided into three distinct groups. Those who felt that the generation of commercially exploitable IP was a "given", a function of the discipline, those who felt it was a function of certain characteristics of individual members of staff, and those who felt it was a function of certain characteristics of the university as a whole.

The interviewees were then asked how aware they thought that members of their own staff were of their university's wish to identify commercially exploitable IP. Their answers, interpreted in terms of a five-point scale are presented in tabular form in Figure 80. It is acknowledged that attempting to interpret the reasons they gave in this manner is a fairly hit-and-miss approach, particularly where the three middle points are concerned ⁽⁴⁾. The table is offered as an indication of the interviewees' impressions of awareness levels, rather than an indication of their staff's actual levels of awareness - and as Figure 80 shows, the interviewees at Liverpool had the impression that levels of awareness among their staff were at best "middling".

All eight interviewees spontaneously suggested why awareness levels were as they had characterised them. The reasons they gave fell into four categories. As Figure 129 shows, levels of awareness were attributed to

- * the organisation of research in the department,
 - * the type of research sponsorship in the department,
 - * the orientation of members of staff,
 - * the amount of publicity on the subject,
- and *
- * their experience of IP

Next, the interviewees were asked whether, in view of the ratio of IL staff to academic staff, they thought the staff in their department/faculty would take a positive or a negative view of being asked to "flag" IP which they thought might have the potential for exploitation. Their answers, interpreted in terms of a five-point scale, are presented in tabular form in Figure 82⁽²⁾. This table is offered as an indication of the interviewees' impressions of staff attitudes, rather than an indication of their staff's actual attitudes - and as Figure 82 shows, half of the interviewees at Liverpool had the impression that the attitude of their staff would be positive or even very positive, while the other half had the impression their attitude would be negative or even very negative. Most of these interviewees spontaneously offered an explanation for the negative attitude which they imputed to their staff. The reasons they gave fell into two distinct categories, as Figure 238 shows: their staff would regard being asked to "flag" IP as either

- * burdensome,
- or
- * financially suspect

It was suggested that the university could overcome the first objection if it gave a clear demonstration of the benefits which might accrue if academics "flagged" commercially

exploitable IP. However, success on this front would not resolve the second objection, which, it was claimed, was rooted in a deep-felt irritation at the university's willingness to collude with the UFC by accepting that an increasingly low proportion of its funding would be provided by the Treasury.

The interviewees were then asked whether they thought that the centre, perhaps through the IL office, should take a proactive or a reactive approach to trying to identify potentially exploitable IP - *ie.* should the university rely exclusively on members of staff coming forward and "flagging" IP opportunities or should it try to ferret out IP which academics might have overlooked or been too busy or too disinterested to "flag"? As Figure 83 shows, three-quarters of the interviewees at Liverpool were in favour of a proactive approach - though half of them felt this would be impossible to achieve in practice. Only one quarter opted for a purely reactive approach.

Finally, the interviewees were asked to consider two systematic "fail-safe" mechanisms which might be employed - scrutinising research projects at the proposal and/or interim/final report stage and scrutinising drafts of papers before submission to journals. As Figure 130 shows, where scrutinising research projects at the proposal and interim/final report stages was concerned, seven of the eight interviewees at Liverpool were against the idea, and only one indicated that he might be prepared to consider it. There was slightly less resistance to scrutinising drafts of papers - although five were against the idea, one said he might be prepared to consider it and two reported that they were in favour of the idea. When asked to explain why they took these views, all those who were against this kind of scrutiny gave a reason. Upon examination, it appeared that the reasons they gave fell into three distinct categories. As Figure 131 shows, these particular interviewees felt that this kind of scrutiny would.

- * require greater expertise than was available inside or outside the university,
- or * be of dubious cost-benefit

10.4.3 Ownership of Intellectual Property Generated by Academics

It was explained to the interviewees that the 1977 Patent Act rules on the ownership of employee inventions, as does the 1988 Copyright, Designs and Patent Act on the ownership of copyright material created by employees. They were told that in Britain academics appear to be treated by IP law in the same way as any other employee the intellectual property they generate belongs to their employer unless it is unrelated to their work. The interviewees were also told that in a number of other industrial nations, IP laws specifically exclude academics from the employee ownership provisions. They were then asked which they thought was the more appropriate

Few interviewees responded quickly to this question, for many it was clearly *terra incognita* and they required time to digest the question, ask supplementary questions and double-check that they had understood the answers before formulating their own answer. As Figure 132 reveals, at the end of this clarification process, the eight interviewees at Liverpool came to quite divergent conclusions. Half felt the IP should belong to the university, while two thought it should belong to the academic(s) who generated it and another two suggested that joint ownership seemed the most appropriate approach. The terminology employed by the latter two interviewees suggests that they had not previously encountered the concept, but had arrived quite independently at this solution to the problem. None of the interviewees at Liverpool seemed to be aware that joint ownership was, in fact, their university's stated policy - let alone cognisant of the fact that their university was signally failing to implement its stated policy.

There was no obvious pattern to these interviewees' judgements regarding the ownership of IP generated by academics. For instance, those who had worked in industry for a period did not necessarily espouse the view that IP should belong to the employer, conversely, those who had had an exclusively academic career did not necessarily espouse the view that the IP should belong to the academic(s) who generated it. When asked why they held the view which they had articulated, several cited the same or similar reason(s). Upon examining these reasons, just three distinct categories emerged. As Figure 133 shows, essentially, these particular interviewees from Liverpool explained their views on the ownership of IP in terms of.

- * provision of the necessary infrastructure,
- * the locus of direction of academic research;
- or * the morality of claiming ideas generated by others.

10.4.4 Protecting Intellectual Property Generated by Academics

The interviewees were asked whether they agreed with the broad concept of "protecting" IP where academic research discoveries were concerned. In one or two cases it proved necessary to explain what was meant by "protecting" IP, since the interviewees in question did not initially understand the question. As Figure 134 shows, once they understood the meaning of the question, six out of the eight interviewees at Liverpool reported that they were in favour of the broad concept, while a further two agreed, with some reservations, only one disagreed with this broad concept. Each gave a reason for the view expressed. As we can see from Figure 135, the reasons they gave seemed to fall into six distinct categories. Support for the broad concept of "protecting" IP was explained by these particular interviewees from Liverpool in terms of

- * the anticipated financial gain,
 - * the control over IP conferred by "protection",
 - * the ability to counteract foreign competition,
- or
- * ignorance of objections.

Reservations were explained in terms of.

- * inherent difficulties,

while a lack of support for the broad concept was explained in terms of

- * supposed secrecy

Next, the interviewees were told that, as employers UK universities are under no obligation to file a patent application on inventions generated by academics; they can choose to "protect" it by treating it as secret know-how. They were then asked how they felt about treating academic research discoveries as secret know-how. It became clear from the ensuing discussion that these interviewees had no idea that if they notified the university of potentially exploitable IP, the university had the legal right to insist that it should be "protected" by keeping it secret. And, as Figure 136 reveals, upon hearing this half of the interviewees at Liverpool said that they disagreed completely with the idea of treating academic research discoveries as secret know-how. Asked why they disagreed, three of the four each gave one reason. As we can see from Figure 137 shows, the reasons they gave fall into the same distinct category. These particular interviewees explained their antipathy towards secret know-how as a form of "protection" in terms of

- * the proper function of a university.

Two interviewees accepted the idea of secret know-how provided certain conditions were fulfilled. One felt that the university should not opt to "protect" by means of secret know

how unless the academic(s) who generated the IP were in favour of the idea, since the resulting prohibition on disclosure in any form would prevent them from exploiting the discovery intellectually and could delay their career development. The other did not suggest that the academic(s) concerned should be able to veto the secret know-how option, but he certainly felt that the decision should be made in the light of an honest assessment of the relative benefits of exploiting a discovery intellectually as opposed to commercially. We might categorise these conditions as

- * academic-centred:
- or * cost/benefit-centred

Only two interviewees agreed without reservation with the idea of "protecting" academic research discoveries by treating them as secret know-how. As Figure 137 reveals, the reasons they gave fall into the same distinct category. These particular interviewees at Liverpool felt that

- * the end justifies the means

Asked whether they thought that patenting was preferable, if there was a choice, as Figure 138 indicates, one half of the interviewees felt that patenting was preferable if there was a choice, while the other half felt that patenting was not necessarily preferable.

In view of the fact that UK universities are under no legal obligation to file a patent application on IP generated by academics, that they can choose to "protect" it by treating it as secret know-how, the interviewees were next asked exactly who had the right to decide whether and how to protect IP generated by academics at Liverpool. As we can see from Figure 93, it transpired that not one of them knew what the university's policy was *vis-a-vis* this question - though one guessed correctly that if there was a conflict between the academic(s) who generated the IP and the IL office, the senior management team

would be called upon to decide the outcome. Three suggested that the Vice-Chancellor alone would make the decision while another felt that in the final analysis, this question would probably be decided by the Chancellor; the other three felt unable to hazard a guess. As Figure 94 shows, upon being informed of the university's policy, three interviewees said they agreed with it, while another three disagreed, two - significantly, perhaps, the two Deans - indicated that they were ambivalent. Asked why they held the views they had articulated, each interviewee gave one reason. As we can see from Figure 139, the reasons they gave seemed to fall into four distinct categories. These particular interviewees from Liverpool explained their attitude to university policy in terms of.

- * academic freedom;
- * commercial judgement,
- * pragmatism,
- or * IP ownership

It is interesting to compare interviewees' opinions on questions like who should make the final decision about whether and how to "protect" IP and whether inventions should be "protected" by treating them as secret know-how with their opinions on who should own IP generated by academics. As we have seen, four of the eight said they felt that the university should own such IP. However, only two of them felt it was appropriate for the senior management team to make the final decision as to whether and how to "protect" such IP; the other two either disagreed with this policy, believing that the university should defer to the wishes of the academic(s) concerned, or were ambivalent about it, seeing arguments in favour of both approaches. Moreover, one of the two who agreed with university policy - the only interviewee to overtly relate his views on the final decision to his views on ownership - was firmly against the idea of "protecting" IP by treating it as secret know-how, in other words, tacitly he wished to circumscribe the

decision-making powers of the senior management team whose right to make the final decision he supported. It is not surprising that one of the two who thought that academics should own the IP they generate disagreed with the university's policy that the senior management team should make the final decision about whether and how to "protect" such IP, however, curiously the other agreed with this policy. Both were against the idea of "protecting" IP by treating it as secret know-how, however. One of the two who advocated joint ownership of IP generated by academics disagreed with the university's policy that the senior management team should make the final decision about whether and how to "protect" such IP, while the other was ambivalent about it, seeing arguments in favour of both approaches. The first was prepared - in certain circumstances - to accept the idea of "protecting" it by treating it as secret know-how, while the second was firmly against the idea.

The interviewees were next asked a series of questions designed to explore their attitude to the logistics of "protecting" IP by patent. They were informed that it was Liverpool's policy for the academic(s) who generated the IP to write a page or two of notes, which a patent agent would then work up into a formal specification. This information was received without comment by seven interviewees; the eighth commented that if he felt a member of his staff was working on something of commercial importance, the department would bring in a patent agent he knew from London. The interviewees were then asked how they would respond to a member of staff who wished, on a voluntary basis, to become more involved in drafting the patent specification and who therefore requested a temporary reduction in his/her workload. As Figure 96 shows, three of the six interviewees at Liverpool who answered this question were not prepared to temporarily reduce the workload of a member of staff in order to help them write the patent specification, whereas one was prepared to consider the idea and two indicated that they

certainly would do something to help the member of staff in question. Each interviewee was asked what made him respond in the way he had. As we can see from Figure 140, the reasons given fell into two categories. These particular interviewees from Liverpool explained their attitude to temporarily reducing the workload of a member of staff in terms of

- * departmental flexibility,
- or * the perceived nature of the task

It is interesting to compare the extent of these interviewees' preparedness to help members of staff writing patent specifications with their views on the ownership. We might have expected those who felt that ownership should be vested in the academic(s) who generated the IP to be less prepared to help than those who felt that ownership should be vested in the university. However, there is no such association, indeed, there appears to be no pattern at all to interviewees' attitudes.

10.4.5 Entrepreneurially Exploiting Intellectual Property Generated by Academics

The interviewees were asked a series of questions to elicit their views on entrepreneurially exploiting "hard" IP generated by academics, instead of routinely licensing or assigning it to an existing company. This proved to be one of the more difficult sections of Questionnaire C to administer and it is correspondingly difficult to analyse. Only two of the interviewees at Liverpool seemed to base their opinions on knowledge of particular enterprises, the rest appeared to be speaking hypothetically - in so far as they felt able. Three of the eight interviewees did not initially understand the difference between wholly-owned university companies, joint ventures with members of the academic staff and independent academic spin-out companies and even when this was explained to them, one

felt unable to express an opinion on any of these entrepreneurial scenarios. It had been hoped to construct a table indicating whether the interviewees expressed approval, qualified approval or disapproval for the various entrepreneurial scenarios, and to analyse the reasons they gave in relation to each. However, as Figure 141 shows, with two exceptions the interviewees gave reasons for their views on exploiting "hard" IP entrepreneurially *per se*, reasons unrelated to specific entrepreneurial scenarios; this kind of table was not feasible, therefore. Suffice it to say that none of these interviewees indicated they were against the idea of exploiting "hard" IP entrepreneurially *per se*; in fact, between them they volunteered almost as many reasons for supporting the idea as they did caveats and concerns.

Upon examination, the reasons they gave seemed to fall into nine different categories. These particular interviewees explained their views on entrepreneurially exploiting "hard" IP in terms of

- * risk,
- * associated conflicts,
- * the perceived cost/benefit,
- * the entrepreneurs' fitness for the task,
- * the blurring of the divide between academia and industry,
- * the income thought to be generated,
- * the university's role as a midwife to enterprise,
- * perceived third party benefit,
- and/or * its value as an anti-ossification strategy

The interviewees were then asked for their views on three mechanisms by which academics could exploit "soft" IP. personal consultancy, commercial arms of departments

and spin-off companies

As Figure 101 shows, these particular interviewees from Liverpool felt that extensive consultancy would have a definite affect on the academics concerned. Seven out of the eight felt it would have a negative impact, only four said that it could also have a positive impact. Asked to give examples of the kind of positive or negative impact which extensive consultancy might have, between them the eight interviewees cited 16 examples. As we can see from Figure 142, the examples they gave seem to fall into four categories. These particular interviewees from Liverpool felt that extensive consultancy would have an affect on:

- * the academic's research;
- * the academic's students,
- * the academic's administrative load,
- and/or * the academic's access to one thing or another.

Of course, this is just one set of possible categories for the examples given by these interviewees. We might equally have employed the categories individual, collective and wider community to group them. If we had, we should have observed that of the 16 examples given, none was really concerned with the impact of extensive consultancy on the *individual* academic; seven were concerned with its impact on what we might term the academic *collective*, and a further six could be categorised as concerned with both the academic *collective* and the wider community. Interestingly, none was concerned exclusively with the impact of extensive consultancy on the wider community.

The interviewees were then asked whether they agreed with their university's policy regarding the amount of time per week/month/year members of staff were allowed to

devote to personal consultancy As Figure 143 shows, although at the time Liverpool imposed a limit of a day per week, five of the eight interviewees thought there should be no time limit. Two felt it might be useful to have a guideline in this respect, but only one was in favour of the idea of a time limit, in his view, 50 days should be considered the upper limit, not the norm. Two of those who were against the imposition of a time limit pointed out that it was the type of consultancy which was crucial, not the amount - and a global time limit could not distinguish "*bread and butter*" consultancy from consultancy which had intrinsic as well as extrinsic value. A third objected to what he saw as an arbitrary figure, plucked from the air.

Next, the interviewees were asked a series of questions designed to elicit their views on staff exploiting "soft" IP via a commercial arm of the department. Only one of the six HoDs reported that a commercial arm had been established in his department - in fact, two - both "bottom-up" initiatives, the results of which he had inherited when he became HoD As Figure 144 shows, there was only one significant difference between the two, namely the parties who financially benefitted from their activities In one case, the financial benefit went primarily to the academics who exploited their expertise via the commercial arm; in the other, the financial benefit went primarily to the host department.

In both cases the host department perceived there to be benefits other than direct financial benefits arising from the activities of the commercial arm. As Figure 145 shows, we might categorise those which were mentioned as

- * enhancement of reputation;
- and *
- * job creation

Both commercial arms had also caused considerable controversy in the host department.

As we can see from Figure 146, we might categorise the grounds for controversy mentioned as:

- * attitudes to the type of work undertaken;
- and * disputes over legitimacy.

The five HoDs whose departments had no commercial arm were asked why none had been established. As we can see from Figure 147, we might categorise the reasons they gave as:

- * the perceived inutility,
- * perceived opportunity costs,
- and * concern over the beneficiary

Where exploitation of "soft" IP by means of a company of one sort or another is concerned, interviewees were simply asked whether they made a distinction - when formulating their views on the various entrepreneurial scenarios - between academics who founded or were involved with "hard" companies and those who founded or were involved in "soft" companies. Given that the data on interviewees' views of academics founding or becoming involved in various types of "hard" companies are very patchy, it is evident with the benefit of hindsight that this was not the most helpful way to ascertain their views in relation to the various types of "soft" company. Suffice it to say that four interviewees felt there were no grounds for distinguishing between academics who founded or were involved in "hard" companies and those who founded or became involved in "soft" companies, while two felt there were. One saw "hard" companies as less acceptable since they perceived them to be less intellectually demanding than "soft" companies exploiting "soft" expertise - *ie.* less demanding in terms of their academic discipline. The other saw "hard" companies as less acceptable because they would make greater demands on the entrepreneurial academic's time than would "soft" companies

10.4.6 Support for Entrepreneurial Academics

The interviewees were asked a series of questions designed to ascertain the extent to which would-be academic entrepreneurs in their department might be given practical support to help them in their entrepreneurial endeavours.

Questionnaire C focussed initially on three different mechanisms for giving would-be academic entrepreneurs time to devote to business start-up:

- i) a formal reduction in or rescheduling of the academic's normal workload for a limited period,
- ii) a part-time contract for a limited period,
- iii) complete leave of absence for a limited period,

It was the university's policy in 1989/90 to leave to the discretion of the relevant HoD the amount of time which academics might devote to entrepreneurial activities. As Figure 148 shows, there appear to be considerable discrepancies in the approach of these particular HoDs from Liverpool. At the time the interviews were conducted, would-be academic entrepreneurs in four departments could not have persuaded their HoD to temporarily reduce or reschedule some of their primary academic commitments while they strove to start their company, while their colleagues in two other departments might have been able to persuade their HoD to provide this kind of support, if certain conditions were fulfilled. Similar discrepancies are manifested in relation to temporary part-time contracts or complete leave of absence for an agreed period as mechanisms for giving would-be academic entrepreneurs time to devote to their business activities. In principle, academics from two departments would have received a sympathetic response to either proposal from their HoD, while their *confreres* in three other departments could not have counted on a sympathetic response. In practice, academics from three departments would have had

either proposal refused, while their colleagues in another two departments might have been able to persuade their HoD to support either proposal

On the face of it, this would appear to be a fairly significant finding. It suggests that effectively HoDs in some science or engineering or medical departments would either inhibit staff from founding/co-founding a company to entrepreneurially exploit IP arising from their research or, at the very least, inhibit the rapid growth of the company by limiting the time which the would-be academic entrepreneur could devote to it. In the same way, they would also inhibit the founding - or, at the very least, the rapid growth of any wholly-owned university company designed to exploit IP generated by a member of their staff. However, only one of the HoDs interviewed at Liverpool had been appointed HoD on a permanent basis, the others held the office for a limited period - and all but one of them has since relinquished office. Of course, from the perspective of this study (and the perspective of would-be academic entrepreneurs) this raises questions as to the approach of these HoDs' successors. It is also debatable whether, having been refused by one HoD, would-be academic entrepreneurs - particularly junior members of staff - would be prepared to grasp the nettle and broach the subject with the next.

Notwithstanding the transience of most HoDs at Liverpool, it is worth examining the reasons cited by certain HoDs for not being prepared to create a window of time for academics to devote to business start-up by employing certain mechanisms. We need to establish whether they are subjective or objective - a matter of the HoD's idiosyncratic *Weltanschauung*, perhaps, or a matter of obstacles, surmountable or insurmountable. Similarly, it is important to examine the conditions imposed by some HoDs, which, if fulfilled, would tip the balance in favour of the would-be academic entrepreneur.

The four HoDs who flatly rejected the idea of reducing or rescheduling a would-be academic entrepreneur's normal workload for a limited period cited four different reasons. One gave a reason which we might categorise as logistical, observing that it had been quite hard enough to create a framework in which staff could take long-overdue sabbaticals. A second was not prepared for members of his staff to be paid to devote time to peripheral activities, at the expense of their primary responsibilities, while a third was not prepared for his staff to be paid to devote time to activities undertaken of their own volition and for personal gain. The fourth felt that even if the department gained financially from the entrepreneurial activities of the member of staff, temporarily reducing or rescheduling their normal workload represented an academic opportunity cost. One of the two HoDs who conceded that they might possibly temporarily reduce or reschedule a would-be academic entrepreneur's normal workload made his support conditional upon receiving financial assistance from the university to pay for teaching cover. The other made it conditional upon the university or the department gaining financially in the long term from the member of staff's entrepreneurial endeavours.

The three HoDs who rejected the idea of a part-time contract or complete leave of absence for an agreed period did so for the same reason. Owing to Liverpool facing a deficit, the department would not be allowed to keep the salary savings and use them to pay for teaching cover; none of them was prepared to ask other members of staff to take over part of the would-be academic entrepreneur's workload. One of the three also said that the resulting change to his staff student ratio would be unacceptable to the UFC. One of the two HoDs who conceded that they might support an application for a part-time contract or complete leave of absence for an agreed period made his support conditional upon finding a source of funding to pay for teaching cover. The other made his support conditional upon the nature of the business. He would not look sympathetically on requests to start up

a "hard" company

It is difficult to evaluate claims that temporarily reducing or rescheduling a would-be academic entrepreneur's normal workload is out of the question on logistical grounds. This may be a statement of fact, or it may be symptomatic of a HoD who does not subscribe to the philosophy "Where there is a will there is a way"; or it may be symptomatic of the morale of the department concerned, or a relatively inflexible way of working. If it is a statement of fact, this is clearly an objective, inhibiting factor which is department-specific and may only disappear in time - though equally it may become reinforced if the pressures on staff increase rather than diminish. If it is symptomatic of the HoD's *Weltanschauung*, this is also an inhibiting factor which is department-specific and should disappear in time, once he relinquishes office. On the other hand, it is a subjective obstacle rather than an objective one, and may be amenable to persuasion on the part of key figures in the university - if they are so minded. If it is symptomatic of the morale of the department or a relatively inflexible way of working, this may be more difficult to overcome. The suggestion that a reduction in the staff student ratio might be unacceptable to the UFC is also department-specific, it is another objective, inhibiting factor which may disappear in time - or become reinforced.

The perception that academic involvement in business start-up is a peripheral as opposed to a mainstream activity, an academic opportunity cost *etc* could be regarded as a subjective inhibiting factor - possibly a function of the HoD's idiosyncratic *Weltanschauung*, or the ethos of the department. On the other hand, it could be a function of the discipline, which, even if we choose to categorise it as another subjective inhibiting factor, is probably far harder to change and therefore more of an objective barrier in practice. Alternatively, this perception could be a function of the university's self-

proclaimed *raison d'être* - but if this is the case, we might have expected more than two HoDs to raise this kind of objection. Disapproval of "hard", "widget-making" companies is similarly ambiguous when it comes to categorising the nature of the barriers to entrepreneurship.

Where salary savings and teaching cover are concerned, at the time this clearly constituted an objective obstacle at Liverpool for a number of departments. However, it could be argued that passive acceptance of this obstacle is indicative of a lack of vision on the part of these particular HoDs - or perhaps on the part of the IL office or the university itself. It had clearly not occurred to any of these HoDs (or the IL office?) that an entrepreneurial venture which was deemed to be a potential winner by investors should attract sufficient venture capital as to allow the academic concerned to buy out part or all of his time for a limited period. The HoDs who referred to the university and/or the department gaining financially in the long term from the academic entrepreneur's activities - as a *quid pro quo* - showed more vision. On the other hand, it is not clear how realistic they were being, given that a sizeable proportion of high-tech start-ups in Britain fail within the first five years. The HoD who was not prepared for his staff to be paid to devote time to activities undertaken of their own volition and for personal gain was doubtless unaware of this - and unaware of the increasing evidence that many academics get involved in company start-up for the intrinsic value of the thing, not for extrinsic rewards, that extrinsic rewards may take years to materialise, if they materialise at all, and that many academics choose not to make personal gain from their entrepreneurial activities.

10.4.7 Incentives and Disincentives

The interviewees were asked a series of questions designed to ascertain their awareness of various incentives and disincentives operating at Liverpool in relation to the exploitation

of IP, and their attitude to the incentives and disincentives in question.

Let us look first at the exploitation of "soft" IP via personal consultancy - focussing first on the way the university treated the income earned by academics in the process. As chapter 8 revealed, Liverpool imposed no earnings limit on academics wishing to do personal consultancy, preferring to impose a time limit to control the time devoted to this activity Chapter 8 also revealed that in 1989-90 Liverpool required academics to formally seek permission to do personal consultancy and took a cut of 25 per cent of their fee, over and above any charges levied for use of human or physical resources It was indicated that the percentage charged had risen over the years from 10 per cent to 25 per cent, partly to offset the costs of providing professional indemnity and liability insurance As we can see from Figure 108, none of the eight Deans and HoDs interviewed at Liverpool knew whether or not the university imposed an earnings limit Moreover, only two were certain that the university took a 25 per cent cut of academics' earnings from personal consultancy, four were aware that the university took a percentage cut, but could not say what percentage, while the remaining two did not know that the university took any percentage, let alone the specific percentage

Figure 109 records the interviewees' own attitudes to the university's approach to the income earned by academics from personal consultancy Half agreed that there should be no earnings limit, while one thought there should be and two were ambivalent Figure 109 shows that more interviewees were ambivalent about the university taking a percentage of the income earned, their ambivalence was occasioned largely by the specific percentage taken - which they all felt was high - rather than the principle of taking a percentage *per se* One interviewee disagreed with both the percentage taken and the principle *per se* However, two agreed with both the principle and the specific percentage

Figure 149 details the reasons given by the eight interviewees for their attitude to the university's approach to the income earned by academics from personal consultancy. Efforts to group and characterise these reasons yielded five categories. These particular interviewees explained their views in terms of:

- * staff motivation;
- * perceived excess,
- * a perceived lack of discrimination,
- * a quid pro quo,
- or * guidelines

Let us look now at the impact of personal consultancy on promotion at Liverpool. Chapter 8 revealed that Liverpool's promotion criteria said nothing explicit about consultancy, but that there were references to activities which might conceivably include significant personal consultancy. Figure 111 shows that seven of the eight interviewees were aware of this, only one was hazy about what the promotion criteria said in this respect. Figure 111 also shows that at least three interviewees felt that in practice personal consultancy was unlikely to be taken into account by the promotions committee, while at least one was uncertain how it would be regarded.

Asked whether they themselves thought that personal consultancy should be taken into account by the promotions committee, over half the interviewees said that they felt it should be, while one was ambivalent, as we can see from Figure 112. Figure 150 details the reasons given by six of the interviewees for their views. Efforts to group and characterise them yielded five categories. These particular interviewees explained their views in terms of

- * income generation,
 - * creativity,
 - * the gauge of external value which personal consultancy represented,
 - * the need for a holistic approach to promotion,
- or
- * the inappropriateness

Let us turn now to the exploitation of "hard" IP by licensing/assigning it to an existing company. Figure 114 shows the extent to which the eight Deans/HoDs were aware of their university's policy *vis-a-vis* the distribution of income from the exploitation of IP. As we can see, over half were unaware of the fact that Liverpool generally divided income from royalties, option fees *etc* between the academic(s) concerned, their department(s) and the centre - let alone aware that the percentage split was 50 25 25 respectively. A further two were aware that the university divided the income, but could not say how. Only one interviewee demonstrated that he was aware of both principle and practice. Once they had been given details of the usual percentage split, the interviewees were asked how effective an incentive they felt this was. We can see from Figure 115 that none of the Deans/HoDs from Liverpool regarded this as an effective incentive to "flag" potentially exploitable IP. Indeed, one felt it was not effective at all. However, most were either ambivalent or uncertain about its effectiveness.

Figure 151 details the reasons given by these interviewees for their views on the effectiveness of income sharing as an incentive. Efforts to group and characterise them yielded the following three categories. Four of these particular Deans and/or HoDs were ambivalent or uncertain about this because saw income sharing as

- * a purely hypothetical reward,
- or
- * in conflict with other policies,

while the eighth felt it was

- * illogical

Let us look now at the impact of patents, licenses *etc* on promotion. As chapter 8 revealed, Liverpool claimed that a policy decision had been taken in the mid-1980s to treat patents, licenses *etc* as factors which should be taken into account when considering applications for promotion - though this was not formally articulated in the promotions criteria. Figure 117 shows that six of the interviewees were aware of this, but that only two felt that this was likely to be implemented in practice. One was uncertain about how patents, licenses *etc* would be treated by the promotions committee, while three regarded them as unlikely to be considered - indeed, one described the notion as "*hokum*".

Figure 118 indicates the interviewees' own attitude to the impact of patents, licenses *etc* on promotion. As we can see, at least half felt that these should number among the factors taken into account. Figure 152 details the reasons given by three interviewees for this view and as we can see, efforts to group and characterise them yielded two categories. These particular Deans and HoDs felt that patents, licenses *etc* should number among the factors taken into account for promotion because of

- * their being a sign of ability,
- or
- * the need for a holistic approach to promotion,

Let us turn now to the entrepreneurial exploitation of IP - whether the IP in question is "hard" or "soft". Chapter 8 indicated that in the mid-late 1980s Liverpool attempted to support academic entrepreneurs by establishing an "umbrella" holding company with subsidiaries within which entrepreneurial academics could shelter, if they were so minded - a company whose staff would undertake the more routine company tasks on their

behalf. However, chapter 8 revealed that Liverpool effectively "taxed" academic entrepreneurs by requiring them to pay to the university either 15 per cent of the company's annual profits or 25 per cent of their personal income from director's fees, dividends, sale of shares or selling on the company itself *etc*. As we can see from Figure 120, six of the eight Deans/HoDs interviewed were unaware that it was the university's policy to "tax" academic entrepreneurs in this way, let alone aware of the specific percentages involved. One was aware of the principle, but not the specifics of its implementation. Only one was aware of both principle and practice - primarily because he himself was an academic entrepreneur and the university had brought this to his attention. Figure 121 shows us that, having been told about principle and practice, three interviewees indicated that they agreed with the university's approach while a further three were ambivalent and two disagreed.

Figure 153 details the reasons given by seven interviewees for the views they expressed. Efforts to group and characterise them yielded three categories. These particular Deans/HoDs explained their attitude to the income earned by academics from the entrepreneurial exploitation of IP in terms of

- * parity,
- * a perceived *quid pro quo*;
- or * the need for a time-limit

In 1989-90 and the preceding years Liverpool's promotion criteria were silent on the subject of the likely impact of the entrepreneurial exploitation of IP on applications for promotion. As we can see from Figure 123, at least seven of the eight interviewees were aware of this silence. Figure 123 also shows us that these interviewees had very diverse views on how the entrepreneurial exploitation of IP would be treated by the promotions

committee in practice. While three had no idea, two felt it would not be taken into account. Another two believed it would be taken into account, but one of the two felt it would have a negative rather than a positive impact.

The interviewees were asked whether they themselves felt that the entrepreneurial exploitation of IP should be one of the factors taken into account when considering applications for promotion. It is clear from Figure 124 that once again the Deans/HoDs interviewed had fairly diverse views on this subject. Two felt it should not be taken into account, whereas three felt it should be taken into account - but one of the three advocated giving it a negative weighting. Two interviewees were ambivalent. Both felt it was impossible to make a principled ruling on this, since it depended on the merits of individual cases. One suggested that it should depend on the impact of entrepreneurship on the academic's primary commitments, while the other argued that it should depend on the financial benefit to the university from the academic's company - in other words, no financial benefit, no taking this activity into account. Figure 154 details the reasons given by six interviewees for their views. Efforts to group and characterise them yielded three categories. These particular interviewees felt that the entrepreneurial exploitation of IP should count towards promotion on grounds of it being

- * a contribution to the community;
- * a sign of ability;
- or * inappropriate

Case Analysis:
Strathclyde University

10.5 Strathclyde University

10.5.1 Removal of the BTG's Monopoly and Response to the Kingman Letter

As Figure 72a shows, six of the seven interviewees at Strathclyde reported that they had been aware of the removal of the BTG's monopoly - whereas only five claimed to have been aware of the fact that the university had been offered the opportunity to assume rights and responsibilities previously enjoyed by the BTG. From the perspective of the Research Councils and the government, this is a relatively encouraging finding, if one takes into account Strathclyde's belated and largely unsystematic approach to communicating either piece of information.

Those who reported awareness were asked if they could remember when and how they had learned of the event(s) in question. As Figure 72b shows, between them those who could remember reported a range of information sources, mostly internal, but not exclusively. However, what is more striking is the fact that half - or more - could not remember how they had come by either piece of information.

Questioned about their attitude to the removal of the BTG's monopoly and the Research Councils' offer, none of the interviewees who said they had been aware of these two events at the time reported that they had been against the idea of their university assuming rights and responsibilities previously enjoyed by the BTG. As Figure 73 shows, only two indicated that they had been indifferent to this idea, whereas three professed to have been in favour of it. Upon examining the reasons which these interviewees gave for the attitude they claimed to have held, they seemed to fall into four distinct categories. These particular interviewees explained their attitudes in terms of

- * perceived expertise,
 - * a desire for control,
 - * interest,
- or
- * a persuasive concept.

As Figure 155 reveals, one interviewee admitted his indifference had been due to lack of interest, while the other said he had feared that patenting was beyond the expertise and resources of any UK university. In striking contrast, one fellow interviewee explained his support for the idea in terms of his belief that Strathclyde was just as expert as the BTG when it came to exploiting IP arising out of academic research. Another justified his support in terms of the control over the exploitation process which assumption of those rights and responsibilities would give both the department and the university. The last explained his support in more general and detached terms, seeing the university's assumption of these rights and responsibilities as a persuasive concept.

Asked why they thought that their university had decided to accept the Research Councils' offer, between them the seven interviewees gave twelve reasons. Efforts to group and characterise these yielded five distinct categories, as Figure 156 shows. These particular interviewees felt that the university was motivated by:

- * its mission;
 - * enterprise;
 - * financial gain;
 - * perceptions of expertise,
- and/or
- * control.

Asked who they thought should have been involved in the decision-making process in relation to their university's response to the Research Councils' offer, most interviewees at

Strathclyde answered in terms of the status and/or function, group membership or perceived characteristics of the people they thought should have been involved.

Accordingly, a categorisation scheme was devised which accommodated these criteria.

Figure 157 categorises interviewees' responses to this question in terms of this scheme

Two interviewees' responses could not be categorised in this manner, however; one felt that there was no need for a decision-making process, since it was obvious that if you were offered new rights, you accepted them, the other could not be persuaded to specify in sufficient detail who he thought should have been involved

Noticeably, although the interviewees were asked who they thought should have been involved in the decision-making process, as Figure 157 shows, five of the interviewees at Strathclyde spontaneously gave their views on who they thought should have been involved in the consultation process, too, and one of those omitted to specify who he thought should have been involved in the decision-making process.

Figure 157 reveals a fair degree of concensus on both questions. Three of the five interviewees who addressed themselves to the consultation process suggested that the same individual administrator - defined by function - and the same dual-membership entity - comprising both administrators and academics - should be involved in this process. A fourth saw this as a matter which required particularly wide consultation - entailing representative academics, administrators (defined by function and by status) and an entity with dual membership (*ie.* both academics and administrators). Only one felt that this matter should be put to the senior academic entity in the institution, with no input from the administration at all

When it came to the categories of people interviewees thought should be involved in the decision-making process, there was complete unanimity the four who addressed this question felt it was entirely the responsibility of one and the same dual-membership entity.

Finally, this categorisation scheme also suggests that these particular interviewees felt that their university's response to the Kingman letter was something to be decided at the senior management level, rather than "middle" or lower management level - though middle management was seen by the majority of interviewees as playing a role in the consultation process.

10.5.2 Identifying Intellectual Property Generated by Academics

The interviewees were asked a series of questions designed to elicit their views on the context in which commercially exploitable IP might be generated in a university. As **Figure 77** shows, four of the seven interviewees at Strathclyde felt that certain science or engineering disciplines were more - or less - likely than others to generate commercially exploitable IP. When asked which disciplines they had in mind, between them these respondents cited four which they felt were less likely to generate commercially exploitable IP, and seven which they felt were more likely to - as detailed in **Figure 78**.

However, three interviewees thought that no disciplines were more or less likely to generate commercially exploitable IP, instead, as Figure 79 reveals, they felt that the generation of commercially exploitable IP depended on a number of factors. Analysis of the criteria listed in Figure 79 suggests that these interviewees regarded the generation of commercially exploitable IP either as a function of certain characteristics of the university as a whole or, more commonly, as a function of certain characteristics of individual members of staff.

Effectively, then, these particular interviewees at Strathclyde divided into three distinct groups: those who felt that the generation of commercially exploitable IP was a "given", a function of the discipline; those who felt that it was a function of certain characteristics of individual members of staff; and one who thought it was a function of certain characteristics of the university as a whole.

The interviewees were then asked how aware they thought that members of their own staff were of their university's wish to identify commercially exploitable IP. Their answers, interpreted in terms of a five-point scale ⁽¹⁾, are presented in tabular form in Figure 80. The table is offered as an indication of the interviewees' impressions of awareness levels, rather than an indication of their staff's actual levels of awareness - and as Figure 80 shows, over half the interviewees at Strathclyde were either very or fairly confident on this score.

Just one interviewee spontaneously suggested why awareness levels were as he had characterised them. As Figure 158 reveals, he attributed the level of awareness in his faculty to

* the amount of publicity

Next, the interviewees were asked whether, in view of the ratio of IL staff to academic staff, they thought the staff in their department/faculty would take a positive or a negative view of being asked to "flag" IP which they thought might have the potential for exploitation. Their answers, interpreted in terms of a five-point scale, are presented in tabular form in Figure 82 ⁽²⁾. Again, this table is offered as an indication of the interviewees' impressions of staff attitudes, rather than an indication of their staff's actual attitudes - and as Figure 82 shows, all but one of the interviewees at Strathclyde had the impression that the attitude of their staff would be either positive or very positive. One spontaneously volunteered the explanation that there had been a lot of publicity about IP. Another had the impression that the staff in his faculty would have a very negative attitude to being asked to "flag" IP. This particular interviewee spontaneously offered an explanation for the attitude which he imputed to staff in his faculty since the introduction of (largely) devolved budgets, staff in his faculty had become deeply suspicious of activities undertaken by the centre, the cost of such activities was now far more transparent and caused academics to question their value.

The interviewees were then asked whether they thought that the centre, perhaps through the IL office, should take a proactive or a reactive approach to trying to identify potentially exploitable IP - i.e. should the university rely exclusively on members of staff coming forward and "flagging" IP opportunities or should it try to ferret out IP which academics might have overlooked or been too busy or too disinterested to "flag"? As Figure 83 shows, six of the seven interviewees at Strathclyde were in favour of a proactive approach, only one took the opposite view, opting for a purely reactive approach.

Finally, the interviewees were asked to consider two systematic "fail-safe" mechanisms which might be employed - scrutinising research projects at the proposal and/or interim/final report stage and scrutinising drafts of papers before submission to journals. As Figure 159 shows, where scrutinising research projects at the proposal and interim/final report stages was concerned, all seven interviewees at Strathclyde were against the idea. Where scrutinising drafts of papers was concerned, five were against the idea, but two were prepared to consider it. When asked to explain why they took these views, every interviewee at Strathclyde cited two, sometimes three, reasons. Upon examining them, they seemed to fall into five distinct categories. As Figure 160 shows, these particular interviewees felt that this kind of scrutiny would

- * demand more expertise than the ILO had,
- * take too much time, thus delaying publications,
- * be of dubious cost-benefit,
- * infringe confidentiality agreements,
- and/or * enact a strategy based on a false premise.

10.5.3 Ownership of Intellectual Property Generated by Academics

It was explained to the interviewees that the 1977 Patent Act rules on the ownership of employee inventions, as does the 1988 Copyright, Designs and Patent Act on the ownership of copyright material created by employees. They were told that in Britain academics appear to be treated by IP law in the same way as any other employee: the intellectual property they generate belongs to their employer unless it is unrelated to their work. The interviewees were also told that in a number of other industrial nations, IP laws specifically exclude academics from the employee ownership provisions. They were then asked which they thought was the more appropriate.

Few interviewees responded quickly to this question; for many it was clearly unfamiliar territory and they required time to digest the question, ask supplementary questions and double-check that they had understood the answers before formulating their own answer. Several expressed surprise upon being told that the law vests ownership of IP generated by academics in their employer; one asked whether the interviewer was sure she had got her facts right. As Figure 161 shows in tabular form, at the end of this clarification process the six interviewees at Strathclyde who addressed this question came to quite divergent conclusions. Two felt the IP should belong to the university, whereas one thought it should belong to the academic(s) who generated it. However, another two suggested that this need not be decided on a principled basis and written in tablets of stone; both felt that ownership should be decided on an *ad hoc* basis, basing the decision on the merits of the case. The last thought that the research sponsor should own the IP.

There appeared to be a pattern to these interviewees' judgements regarding the ownership of IP generated by academics. Both those who had worked exclusively in academia espoused the view that IP should belong to the employer, the one who espoused the view that it should belong to the academic(s) who generated it had worked longer than any of the others in industry - for over ten years, the two who espoused a flexible approach had worked in industry/commerce for considerably shorter periods, as had the one who felt that ownership should be vested in the sponsor. This is an interesting finding, for it flies in the face of accepted wisdom concerning this question. However, it could, of course, be an entirely spurious pattern.

The interviewees were asked why they held the view which they had articulated. Upon examining the reasons they gave, three distinct categories seemed to emerge. As Figure 162 shows, essentially, these particular interviewees from Strathclyde explained their

views on the ownership of IP in terms of:

- * provision of the necessary infrastructure;
 - * the locus of direction in academic research,
- or
- * considerations of staff motivation

10.5.4 Protecting Intellectual Property Generated by Academics

The interviewees were asked whether they agreed with the broad concept of "protecting" IP where academic research discoveries were concerned. In one case, it proved necessary to explain what was meant by "protecting" IP, since the interviewee in question was not familiar with the terminology. As Figure 163 shows, three of the six interviewees at Strathclyde who answered this question reported that they were in favour of the broad concept, while two disagreed and one felt unable to express an opinion. All but the last gave a reason for the view expressed. As we can see from Figure 164, the reasons they gave seemed to fall into three distinct categories. Support for the broad concept of "protecting" IP was explained by these particular interviewees from Strathclyde in terms of

- * the anticipated financial gain,
- or
- * the need to counteract foreign competition

Lack of support for this concept was explained in terms of

- * the supposed need for secrecy.

Next, the interviewees were told that, as employers UK universities are under no obligation to file a patent application on IP generated by academics, they can choose to "protect" it by treating it as secret know-how. They were then asked how they felt about treating academic research discoveries as secret know-how. It became clear from the

ensuing discussion that none of these interviewees knew that if they notified their university of potentially exploitable IP, the university had the legal right to insist that it should be "protected" by keeping it secret. And, as Figure 165 reveals, four of the six interviewees at Strathclyde who answered this question disagreed completely with this idea. Asked why they disagreed, three of the four each gave one reason. As Figure 166 shows, the reasons they gave fall into the same distinct category. These particular interviewees explained their antipathy towards secret know-how as a form of "protection" in terms of:

- * the proper function of a university

However, two interviewees accepted the idea of secret know-how as a form of "protection", provided certain conditions were fulfilled. One felt that secret know-how should not be an option unless the academic(s) who generated the IP were in favour of it, because opting for secret know-how prevented disclosure in any form and denied them the intellectual kudos which they could otherwise expect. The other thought that secret know-how should not be an option unless the guaranteed financial return was high enough to compensate the academic(s) concerned for the resulting prohibition on publication - but did not specify who should make this judgement. We might categorise these conditions as

- * academic-centred;
- or
- * cost/benefit-centred

None of the interviewees at Strathclyde unreservedly accepted the idea of secret know-how as a form of "protection" - and as Figure 167 shows, asked whether they thought that patenting or secret know-how was preferable as a means of "protecting" inventions, five out of the six who answered this question said that patenting was preferable.

In view of the fact that UK universities are under no legal obligation to file a patent application on IP generated by academics, that they can choose to "protect" it by treating it as secret know-how, the interviewees were next asked who exactly had the right to decide whether and how to protect IP generated by academics at Strathclyde. As we can see from Figure 93, it transpired that not one of them knew what the university's policy was *vis-a-vis* this question - though three guessed correctly that it was policy to let the academic(s) concerned decide. Two guessed (wrongly) that this was a question which would be decided by the ILO and/or the University Management Group, while a third guessed (wrongly) that the Principal would make this particular decision. Upon being told the university's policy in this respect, three indicated that they agreed with its policy, whereas three were ambivalent, as we can see from Figure 94. Asked why they held these views, the three interviewees who were ambivalent cited a reason. As Figure 168 reveals, these reasons seemed to fall into two categories. These particular interviewees from Strathclyde explained their attitude to university policy in terms of.

- * the opportunity cost,
- or * the need for income generation

It is interesting to compare interviewees' opinions on questions like who should make the final decision about whether and how to "protect" IP and "protecting" IP by treating it as secret know-how with their opinions on who should own IP generated by academics. As we have seen, two of the six who answered this question said they felt that the university should own such IP, however, both agreed with the university's policy of allowing the academic(s) concerned to make the final decision about whether and how to "protect" this IP; at the same time, both of them were against the idea of "protecting" IP by treating it as secret know-how. Not surprisingly, perhaps, the one who thought that academics

should own the IP they generate agreed with university's policy of allowing the academic(s) concerned to make the final decision about whether and how to "protect" it, on the other hand, he was against the idea of "protecting" IP by treating it as secret know-how. The two who advocated flexible ownership of IP were ambivalent about the university's policy of allowing the academics concerned to make the final decision about whether and how to exploit such IP. Both felt that the university should be directive, in order to ensure that the IP generated an income. One was firmly against the idea of "protecting" it by treating it as secret know-how, while the other was prepared to accept the idea in certain circumstances. The interviewee who thought that ownership of IP generated by academics should be vested in the sponsor was ambivalent about the university's policy of allowing the academics concerned to make the final decision about whether and how to "protect" such IP. Wearing his academic "hat", he supported it; wearing his Dean's "hat", he felt that the university should be directive, in order to ensure it generated an income from the IP. He was apparently unaware that if the sponsor owned the IP, as he felt was appropriate, the question would not arise.

The interviewees were next asked a series of questions designed to explore their attitude to the logistics of "protecting" IP by patent. They were informed that it was Strathclyde's policy for the academic(s) who generated the IP to write the patent specification in partnership with the patent agent. This information was received without comment by two interviewees; another two asked why the IL office could not arrange things in such a way that the contribution made by academics was smaller. The interviewees were then asked how they would respond to a member of staff who asked for a temporary reduction in his/her workload, in order to concentrate on writing the patent specification. As Figure 96 shows, one of the four interviewees at Strathclyde who answered this question felt that HoDs in his Faculty would not be prepared to entertain the idea, whereas two HoDs said

they would be prepared to consider it and another indicated that he would be prepared to do something to help the member of staff in question. Each interviewee was asked what made him respond in the way he had. As we can see from Figure 169, the reasons seemed to fall into two categories. These particular interviewees from Strathclyde explained their attitude to temporarily reducing the workload of a member of staff in terms of

- * characteristics of the patent;
- or * the perceived cost/benefit

It is interesting to compare these interviewees' preparedness to help members of staff writing patent specifications with their views on the ownership. We might have expected those who felt that ownership should be vested in the academic(s) who generated the IP to be less prepared to help than those who felt that ownership should be vested in the university. However, there is no such association, indeed, there appears to be a pattern at all to interviewees' attitudes.

10.5.5 Entrepreneurially Exploiting Intellectual Property Generated by Academics

The interviewees were asked a series of questions to elicit their views on entrepreneurially exploiting "hard" IP generated by academics, instead of routinely licensing or assigning it to an existing company. This proved to be one of the more difficult sections of Questionnaire C to administer and it is correspondingly difficult to analyse. Most interviewees at Strathclyde based their opinions on "knowledge" of specific enterprises, usually companies which had spun out of Strathclyde, but also famous companies which spun out of universities decades earlier, such as Barr & Stroud in the UK and various enterprises in California's Silicon Valley, that is to say, in the main interviewees at Strathclyde were not speaking hypothetically. However, it was common to find - often

- after fairly lengthy discussion - that their views on, say, university companies were based on mistaken assumptions concerning such companies. So, for example, the views they expressed in relation to, say, university companies, were based on assumptions concerning a company which was actually a joint venture, or a company which they thought was exploiting "hard" IP was actually exploiting "soft" IP, *etc etc*. The interviewer became so concerned to establish what kind of entrepreneurial scenario they were actually talking about that on occasion she paid insufficient attention to ascertaining the reasons for their attitude - particularly their reasons for approval/qualified approval for entrepreneurial exploitation of "hard" IP *per se*.

As a result, the investigator has less confidence in the attitudes detailed in Figure 99 than she would wish, in some instances it is possible that an attitude expressed by an interviewee related to a different entrepreneurial scenario to the one to which it appears to relate in the transcription. For this reason, the investigator made no systematic attempt to relate the reasons they gave for their attitudes to a particular entrepreneurial scenario, preferring to analyse the reasons as a group.

It is noticeable that the caveats and concerns in relation to various entrepreneurial scenarios which these interviewees expressed between them outweighed the reasons they gave for supporting them by a ratio of 1.7. Upon examination, their reasons appeared to fall into five distinct categories, as Figure 170 shows. These particular interviewees from Strathclyde explained their views on the various entrepreneurial scenarios in terms of

- * the income thought to be generated,
 - * their fitness for the task;
 - * associated conflicts,
 - * the perceived cost/benefit,
- and/or
- * the associated risk

The interviewees were asked for their views on three mechanisms by which academics could exploit "soft" IP: personal consultancy, commercial arms of departments and various types of spin-off company.

As Figure 101 shows, five of the seven interviewees from Strathclyde felt that extensive consultancy would have a definite affect on the academics concerned. Two felt it would have a negative impact, however, four said that it could have a positive impact. Asked to give examples of the kind of positive or negative impact which extensive consultancy might have, between them the interviewees concerned cited nine examples. As we can see from Figure 171, the examples they gave seem to fall into four categories. These particular interviewees from Strathclyde felt that extensive consultancy would have an affect on

- * the academic's research,
 - * the academic's students,
 - * the academic's motivation,
- and/or
- * would confer third-party benefit in one way or another.

Of course, this is just one set of possible categories for the examples given by these interviewees. We might equally have employed the categories individual, collective and wider community to group them. If we had, we should have observed that of the nine

examples given, only one was concerned with the impact of extensive consultancy on the *individual* academic. Three were concerned with its impact on what might be termed the academic *collective*, though a further two could be categorised as concerned with both the academic *collective* and the wider community. A further three were concerned exclusively with the impact of extensive consultancy on the wider community

The interviewees were then asked whether they agreed with their university's policy regarding the amount of time per week/month/year members of staff were allowed to devote to personal consultancy. At the time, Strathclyde imposed a limit of 25 days per year. As Figure 172 shows, four of the seven interviewees agreed that there should be a time limit, while two felt it would be useful to have guidelines in this respect, only one was against the idea of a time limit. Two of the four who said that there should be a time limit were happy with the university's chosen limit of 25 days, but the other two felt that this was excessive.

Next, the interviewees were asked a series of questions designed to elicit their views on exploiting "soft" IP via a commercial arm of the department. Three of the five HoDs reported that a commercial arm had been established in their department - or rather, three commercial arms had been established in one department, two in another and just one in the third. All but one had been founded during the "entrepreneurial" 1980s - and all but one were the result of a "top-down" initiative. All but two had been underwritten by the University (or, in one case, the department) to the tune of £50,000-£100,000. As Figure 173 shows, there were other similarities. None had dedicated premises, for instance; that is to say, the four which were not purely notional relied on their host department to allocate them space, rather than negotiate with the centre for their own space.

Figure 173 reveals that there were also significant differences - particularly in relation to their financial *modus operandi*. One received direct financial support from the host department, two received indirect financial support - in the form of rent-free accommodation and free use of equipment/instrumentation, only three were entirely self-funding. The first was receiving direct financial support for a limited period only, while it established itself. However, this logic did not follow through whether the other five were concerned, that is to say, the two which received indirect financial support were not necessarily *en route* towards becoming entirely self-funding. In both cases the department had arranged to receive "benefits in kind" instead of benefits in cash, believing that this conferred a greater benefit. Similarly, there were significant differences in the parties which benefitted from the income of each commercial arm. The commercial arm founded in the 1970s ploughed all its income back to support growth, neither the individual academics involved, the host department nor the university centrally benefitted financially from its activities. Four of the remaining five benefitted both the host department and the university centrally - in the form of overheads. In only one case did the host department retain the income, or rather, the profits. Similarly, in only one case did the individual academics concerned benefit financially from the activities of the commercial arm.

In all six instances the host department perceived there to be benefits other than direct financial benefits arising from the activities of the commercial arm. As **Figure 174** shows, we might categorise those which were mentioned as

- * provision of a service to the department,
- * quality assurance,
- * a source of expertise,
- * a stimulus to collaboration,
- and * enhancement of reputation

Three of the commercial arms had also caused considerable controversy in the host department. As we can see from Figure 175, we might categorise the grounds for controversy mentioned as:

- * a perceived threat,
- and * the tail wagging the dog

The commercial arm which was regarded as the tail wagging the departmental dog was eventually spun-off as a private company. The head of the department in which the fourth commercial arm was located suggested that it had not caused controversy because it had grown organically with the department and had not been grafted on artificially.

The two HoDs whose departments had no commercial arm were asked why none had been established. One reported that the matter had been debated but due to inertia no conclusion had been reached, he expected a departmental commercial arm to be established within the next year or two. The other reported that attempts to establish a commercial arm had failed due to the prospective director's salary concerns - i.e. as a permanent member of the academic staff, he was not prepared to accept a replacement contract which committed him to generating his own salary, even though he had taken the initiative in proposing and gaining acceptance for the commercial arm.

Where exploitation of "soft" IP by means of a company of one sort or another is concerned, interviewees were simply asked whether they made a distinction - when formulating their views on the various entrepreneurial scenarios - between academics who founded or were involved with "hard" companies and those who founded or were involved in "soft" companies. Given that the data on interviewees' views of academics founding or

becoming involved in various types of "hard" companies are of questionable value, it is evident with the benefit of hindsight that this was not the most helpful way to ascertain their views in relation to the various types of "soft" company. Suffice it to say that four interviewees felt there were no grounds for distinguishing between academics who founded or were involved in "hard" companies and those who founded or became involved in "soft" companies, while one felt there were. So, whereas four felt that Strathclyde should insist on taking a stake in companies founded by members of the academic staff to exploit "soft" IP as well as "hard" IP, one agreed with the university's policy of allowing staff to set up independent spin-off companies to exploit their expertise. He observed that it would be difficult to stop academics from doing this, since the university could hardly prevent academics who did consultancy from acquiring a Schedule D tax code.

10.5.6 Support for Entrepreneurial Academics

HoDs were asked a series of questions designed to ascertain the extent to which would-be academic entrepreneurs in their department might be given practical support to help them in their entrepreneurial endeavours.

Questionnaire C explored a number of mechanisms for giving would-be academic entrepreneurs time to devote to business start-up. As chapter 9 revealed, only one of these transpired to be an option at Strathclyde, viz

- * a part-time contract for a limited period,

It was the university's policy in 1989-90 to leave it to the discretion of the relevant HoD to decide whether members of their staff could take advantage of this mechanism for the purpose of pursuing entrepreneurial activities. As Figure 176 shows, in principle the five HoDs were unanimous in their support for the concept of part-time contracts for would-be

academic entrepreneurs. However, it is apparent that this unanimity might not carry through into practice. At the time the interviews were conducted, would-be academic entrepreneurs in only one department could have been sure of persuading their HoD to back proposals for a part-time contract, their colleagues in the other four departments could not count on doing so.

Effectively, then, HoDs in some science or engineering departments would either inhibit staff from co-founding a company with the university to entrepreneurially exploit IP arising from their research or, at the very least, inhibit the rapid growth of the company by limiting the time which the would-be academic entrepreneur could devote to it. However, most HoDs at Strathclyde hold office for limited periods on a rotating basis - and almost all of the five HoDs interviewed have since relinquished office. Of course, from the perspective of this study (not to mention the perspective of would-be academic entrepreneurs) this raises questions as to the approach of these HoDs' successors. It is also debatable whether, having been refused by one HoD, would-be academic entrepreneurs - particularly junior members of staff - would be prepared to grasp the nettle and broach the subject with the next.

Notwithstanding the transience of most HoDs at Strathclyde, it is important to examine the reasons why only one of the five HoDs interviewed would have been unconditionally prepared to create a window of time for academics to devote to business start-up by supporting their application for a part-time contract for an agreed period. The other four HoDs indicated that their support would be conditional upon certain criteria being fulfilled. Three HoDs made their support conditional upon being given sufficient notice. Two felt that they needed to know by early summer of the preceding session, when the teaching schedules were set - i.e. they would need anything from 3-12 months' notice. The

third required only two months' notice - sufficient time to hire a temporary replacement
The fourth made his support conditional upon a different factor - viz. the department not being required to help balance its own or the Faculty's budget by making savings, if either was in deficit, despite the fact that Strathclyde had introduced devolved budgets, he would not necessarily be able to spend the salary saved to pay for teaching cover. One of the first two HoDs added a second condition his support would also depend on the importance of the member of staff concerned to the department, primarily in terms of the subjects he taught - ie if he taught a specialist subject which other members of staff could not teach, he might not gain the support of his HoD

Although three out of the four HoDs made their support conditional upon being given sufficient notice, it is noticeable that there was a significant variation in the amount of notice they required. It is striking that the fifth HoD claimed that he would not only support an application for a part-time contract, but he would also be prepared to implement it immediately, "*today, even*", if it was sufficiently important, he required no notice at all. We could attribute this marked difference to this particular HoD's *Weltanschauung*, to belief in the philosophy "Where there is a will there is a way" and dismiss the other HoDs' need for notice as subjective, department-specific barriers to academic entrepreneurship. However, this is probably too facile. There do appear to be marked, objective differences in the way that departments organise their teaching, and the way in which teaching is organised does seem to have the (unwitting) effect of inhibiting would-be academic entrepreneurs from devoting a window of time to business start-up - or certainly delaying them. The organisation of teaching may well be a departmental tradition which has never been subjected to real scrutiny. It would be wrong, however, to assume that this is a barrier which could necessarily be removed if these four departments organised their teaching more like the fifth HoD, his department is one of the largest in

the university, which confers on it a great deal more flexibility than some departments enjoy

It is striking that the fifth HoD also differs from one of the other HoDs interviewed, in that he claimed he was prepared to pay for teaching cover from departmental funds, if necessary, whereas the other felt that he could not do this if the Faculty budget was in deficit and his department might be called upon to help balance the budget. It is difficult to know what to make of this difference in approach. It could be sheer bravado on the part of one, compared to realism on the part of the other. Alternatively, it could be that the fifth HoD's department's budget has a big enough surplus as to give him sufficient margin to be able to help balance the Faculty's budget and be supportive to would-be academic entrepreneurs in this way. If so, this could be a function of the discipline, the size of the department, the activity level of the staff *etc* - or a combination of these and/or other factors. On the other hand, it is worth noting that one HoD came from the Faculty of Engineering, the other from the Faculty of Science. It may simply be that one Faculty is more prone to problematical deficits than the other.

10.5.7 Incentives and Disincentives

The interviewees were asked a series of questions designed to ascertain their awareness of various incentives operating at Strathclyde in relation to the exploitation of IP, and their attitude to the incentives in question.

Let us look first at the exploitation of "soft" IP via personal consultancy - focussing initially on the way the university treated the income earned by academics in the process.

As chapter 8 revealed, during the 1989-90 session, when the interviews were conducted, Strathclyde was one of the five participating universities which neither imposed an earnings limit nor took a flat-rate or percentage cut of the income earned by academics from personal consultancy. Moreover, Strathclyde provided (*gratis*) professional indemnity cover for all staff doing personal consultancy, provided that they formally notified the university that they were undertaking it. We can see from Figure 108 that all but one of the Deans/HoDs interviewed were aware that the university imposed no earnings limit, and all but two were aware that it took no percentage cut of the income from personal consultancy, one of the two thought that Strathclyde still took a cut of around 20 per cent, however.

The interviewees were asked for their views on the university's approach in this respect. As Figure 109 shows, six agreed there should be no earnings limit, only one disagreed. As we can see, there was far less unanimity on the subject of taking a cut of the income earned by academics from personal consultancy: two agreed with the university's approach, two disagreed and three were ambivalent.

Figure 177 details the reasons given by six of the seven for their attitude. Efforts to group and characterise these reasons yielded four categories. These particular interviewees explained their views in terms of

- * transparency,
- * consistency,
- * a preference for in-house consultancy,
- and/or * options to benefit the university

The three who were ambivalent cited arguments in favour of the university benefitting and arguments against, and were unable to decide which were the more compelling.

Let us look now at the impact of personal consultancy on promotion at Strathclyde. Chapter 8 revealed that Strathclyde's promotion criteria said nothing explicit about consultancy. Figure 111 shows that at least five of the seven interviewees were aware of this. Figure 111 also shows that at least three interviewees felt that in practice personal consultancy was likely to be taken into account by the promotions committee, while at least one felt it was unlikely to be taken into account, another was uncertain how it would be regarded.

Asked whether they themselves thought that personal consultancy should be taken into account by the promotions committee, at least five interviewees said that they felt it should be, while one felt it should not be, as we can see from Figure 112. Figure 178 details the reasons given by these interviewees for the view they held. Efforts to group and characterise them yielded five categories. These particular Deans/HoDs explained their views on the impact of personal consultancy on promotion on grounds of

- * the need for a holistic approach to promotion,
- * the impact of research assessment,

and on grounds of it being

- * appropriate to the discipline,
- * appropriate to the university,
- * difficult to evaluate

Let us turn now to the exploitation of "hard" IP by licensing/assigning it to an existing company. Figure 114 shows the extent to which the seven Deans/HoDs were aware of their university's policy *vis-a-vis* the distribution of income from the exploitation of IP. Chapter 8 revealed that after many years of splitting the income from royalties, option fees *etc* equally between the academic(s) concerned and the centre, Strathclyde finally

bowed to pressure in April 1990 and introduced a three-way split, which took in the relevant department(s), too, for the first time. At the same time, Strathclyde introduced a complex sliding scale. As we can see, only two of the seven interviewees were *au fait* with these changes. Five were aware of the *principle* of splitting the income from IP, but were unable to say how it was split - though some believed the 50/50 split between the academic(s) concerned and the centre was still in operation. Once they had been given details of the sliding scale, the interviewees were asked how effective an incentive they felt this was. We can see from Figure 115 that the interviewees had fairly diverse views on the subject. Only one regarded it as an effective incentive, while four were either ambivalent or uncertain, and two felt it was ineffective. Figure 179 details the reasons given by the seven for their views on the effectiveness of income sharing as an incentive. Efforts to group and characterise those reasons yielded four categories. These particular Deans/HoDs saw income sharing as

- * a purely hypothetical reward,
 - * a just reward,
 - * dependent on orientation,
- or
- * self-defeating

Let us look now at the impact of patents, licenses *etc* on promotion. As chapter 8 revealed, in 1989-90 when these interviews were conducted, Strathclyde had neither an explicit nor even an official policy with regard to this. As Figure 117 shows, at least four of the seven interviewees were aware of this. Figure 117 also shows that the four had very divergent opinions regarding the likelihood of patents, licenses *etc* being taken into account in practice: two felt it was likely, another two thought it was unlikely. We can see from Figure 118 that the four were also divided when it came to their own attitude to the impact of patents, licenses *etc* on applications for promotion. Two felt they should number

among the factors taken into account, while the other two were ambivalent. Figure 180 lists the reasons given by the four. Efforts to group and characterise them yielded three categories. These particular interviewees explained their views on the impact of patents, licenses *etc* on promotion in terms of.

- * the need for a holistic approach to promotion,
- * stimulation of activity;
- and/or * the variable quality of patents.

Let us turn now to the entrepreneurial exploitation of IP - whether the IP in question is "hard" or "soft". Chapter 7 revealed Strathclyde to be one of the most positively disposed of the nine universities towards academic spin-off companies. Moreover, in 1989-90, when the fieldwork was undertaken, Strathclyde neither imposed an earnings limit nor took a percentage of academics' personal income from director's fees, dividends, sale of shares or selling on the company itself *etc*. However, Figure 120 shows us that none of the Deans/HoDs interviewed at Strathclyde was actually aware of this. When told of the university's approach, five signalled their agreement, while one disagreed and another was ambivalent, as we can see from Figure 121.

Four interviewees explained why they felt the way they did. Efforts to group and characterise the reasons they gave - detailed in Figure 181 - led to the positing of three categories. These particular Deans/HoDs explained their views on the income earned by academics from the entrepreneurial exploitation of IP in terms of

- * parity with consultancy;
- * other, preferable mechanisms;
- or * the need for compensation

With regard to the impact of entrepreneurially exploiting IP on promotion, chapter 8 revealed that in 1989-90, when the fieldwork was undertaken, Strathclyde's promotions criteria were altogether silent on the subject of exploiting IP - whether entrepreneurially or by licensing/assigning it to existing companies. Figure 123 shows us that all seven interviewees were aware of this. Figure 123 also shows that they had quite divergent views on the impact which the entrepreneurial exploitation of IP was likely to have in practice. Two felt it was unlikely to number among the factors taken into account, while three were uncertain what to believe and the remaining two felt it was likely to number among the factors taken into account, however, one of these two believed it would have a negative impact.

The interviewees were asked whether they themselves felt that the entrepreneurial exploitation of IP should be one of the factors taken into account when considering applications for promotion. Figure 124 reveals that once again, the seven Deans/HoDs had fairly divergent views on this. Two felt it should not count, while three were ambivalent and two felt it should count. Figure 182 lists the reasons given by five. Efforts to group and characterise these reasons yielded three categories. These particular interviewees explained their views in terms of

- * the need for a holistic approach to promotion,
- * alternative rewards;
- or * the extent to which it was an appropriate activity

C a s e A n a l y s i s :
Y o r k U n i v e r s i t y

10.6 York University

10.6.1 Removal of the BTG's Monopoly and Response to the Kingman Letter

As Figure 72a shows, only two of the four interviewees at York reported that they had been aware of the removal of the BTG's monopoly; the same two claimed to have been aware of the fact that the university had been offered the opportunity to assume rights and responsibilities previously enjoyed by the BTG. From the perspective of the Research Councils and the government, this is a particularly disappointing finding, if one takes into account the fact that once it had received the Research Councils' offer, the university itself systematically communicated both pieces of information to every HoD, who was asked in turn to circulate it to every member of staff and to make any comments they felt were relevant. It is conceivable that delegating to HoDs in this manner was not the best mechanism, in that HoDs may have omitted - intentionally or unintentionally - to pass on this information; it is noticeable that one of the interviewees was appointed HoD after 1985-86; however, when he became HoD, he had been in the department concerned for nearly 20 years.

These two interviewees were asked if they could remember when and how they had learned of these two key events. As Figure 72b shows, while one remembered receiving a university circular in relation to the Research Councils' offer, the other felt he had learned this from the media; both reported that they had learned about the removal of the BTG's monopoly from the media. It is clear that in one case, certainly, receipt of this information predated 1985-86, due to the interviewee's strong interest in the subject.

Questioned about their attitude to the removal of the BTG's monopoly and the Research Councils' offer, neither interviewee reported that he had been against the idea of the university assuming rights and responsibilities previously enjoyed by the BTG. As Figure

73 shows, both indicated that they had been in favour of it. Upon examining the reasons they gave for the attitude they claimed to have held, it was felt that they fell into two distinct categories:

- * expertise;
- or * control.

As Figure 183 reveals, one interviewee explained his support in terms of negative experience of the BTG's ability to exploit the kind of IP generated by his discipline, while the other explained it in terms of the control over the exploitation process which assumption of these rights and responsibilities would give the university

Asked why they thought that their university had decided to accept the Research Councils' offer, only two of the interviewees could think of a reason - one having disputed the suggestion that the university *per se* could have a reason. As Figure 184 shows, the two gave different reasons, which seem to fall into two different categories:

- * financial gain,
- or * logic.

Asked who they thought should have been involved in the decision-making process in relation to their university's response to the Research Councils' offer, all the interviewees at York answered in terms of the status and/or function or group membership of the people they thought should have been involved. Accordingly, a categorisation scheme was devised which accommodated these criteria. Figure 185 categorises interviewees' responses to this question in terms of this scheme.

Noticeably, although the interviewees were asked who they thought should have been involved in the decision-making process, as Figure 185 shows, all four interviewees at York spontaneously gave their views on who they thought should have been involved in the consultation process, too, and one omitted to specify who he thought should have been involved in the decision-making process. Figure 185 reveals complete unanimity where the consultation process was concerned. All four interviewees felt that (the same) representative academics should have been involved - and no-one else at all. When it came to the decision-making process, one interviewee thought this was a matter for the senior academic entity to decide, while another two felt it was something which should be decided by a lower-level entity with dual membership (*ie* both academics and administrators).

This categorisation scheme suggests that these particular interviewees felt that their university's response to the Kingman letter was something to be decided at the senior (academic) management level, rather than "middle" or lower management level.

10.6.2 Identifying Intellectual Property Generated by Academics

The interviewees were asked a series of questions designed to elicit their views on the context in which commercially exploitable IP might be generated in a university. As Figure 77 shows, all four interviewees at York felt that certain science or engineering disciplines were more - or less - likely than others to generate commercially exploitable IP. When asked which disciplines they had in mind, between them these respondents cited seven disciplines which they felt were more likely to generate commercially exploitable IP, and just one which they felt was less likely to. The disciplines they cited are detailed in Figure 78. For all these interviewees, then, the generation of commercially exploitable IP is a "given", a function of the discipline.

The interviewees were then asked how aware they thought that members of their own staff were of their university's wish to identify commercially exploitable IP. Their answers, interpreted in terms of a five-point scale ⁽¹⁾ are presented in tabular form in Figure 81. It is acknowledged that attempting to interpret the reasons they gave in this manner is a fairly hit-and-miss approach, particularly where the three middle points are concerned. The table is offered as an indication of the interviewees' impressions of awareness levels, rather than an indication of their staff's actual levels of awareness - and as Figure 80 shows, half of the interviewees at York were very confident on this score, while the other half were not at all confident

Three of the four interviewees spontaneously suggested why awareness levels were as they characterised them. The reasons they gave were sufficiently diverse as to defy reduction into fewer than three categories. As Figure 186 shows, they attributed levels of awareness to:

- * the amount of publicity,
 - * the type of research sponsorship;
- and
- * their experience of IP.

Next, the interviewees were asked whether, in view of the ratio of IL staff to academic staff, they thought the staff in their department/faculty would take a positive or a negative view of being asked to "flag" IP which they thought might have the potential for exploitation. Their answers, interpreted in terms of a five-point scale, are presented in tabular form in Figure 82 ⁽²⁾. Again, this table is offered as an indication of the interviewees' impressions of staff attitudes, rather than an indication of their staff's actual attitudes - and as Figure 82 shows, most of the interviewees at York had the impression that the attitude of their staff would be neutral, only one had the impression that the

attitude of his staff would be positive - or rather, very positive.

The interviewees were then asked whether they thought that the centre, perhaps through the IL office, should take a proactive or a reactive approach to trying to identify potentially exploitable IP - *ie.* should the university rely exclusively on members of staff coming forward and "flagging" IP opportunities or should it try to ferret out IP which academics might have overlooked or been too busy or too disinterested to "flag"? As Figure 83 shows, three-quarters of the interviewees at York were in favour of a proactive approach. Only one took the opposite view, opting for a purely reactive approach; the HoD in question was firmly convinced that the departmental ethos was such that his staff would automatically "flag" any IP of potential commercial interest, accordingly, he regarded any approach on the university's part as superfluous, amateurish and irritating. His response reflects a narrow focus on his own department; he omitted to consider whether another approach might be required in other parts of the university.

Finally, the interviewees were asked to consider two systematic "fail-safe" mechanisms which might be employed - scrutinising research projects at the proposal and/or interim/final report stage and scrutinising drafts of papers before submission to journals. As Figure 187 shows, all four interviewees at York were against the idea of scrutinising research projects at the proposal stage, whereas three were prepared to consider the idea and one was in favour of the idea of scrutinising interim and/or final reports. Where scrutinising drafts of papers was concerned, three interviewees were against the idea, while one claimed that this was already done in his department. When asked to explain why they took these views, interviewees at York raised one common objection. As Figure 188 shows, these particular interviewees felt that this kind of scrutiny would

- * entail unacceptable bureaucracy.

10.6.3 Ownership of Intellectual Property Generated by Academics

It was explained to the interviewees that the 1977 Patent Act rules on the ownership of employee inventions, as does the 1988 Copyright, Designs and Patent Act on the ownership of copyright material created by employees. They were told that in Britain academics appear to be treated by IP law in the same way as any other employee. The intellectual property they generate belongs to their employer unless it is unrelated to their work. The interviewees were also told that in a number of other industrial nations, IP laws specifically exclude academics from the employee ownership provisions. They were then asked which they thought was the more appropriate.

As Figure 189 reveals the four interviewees at York came to quite divergent conclusions. Half felt the IP should belong to the university, while one thought it should belong to the academic(s) who generated it and another suggested that joint ownership seemed the most appropriate approach. There is a hint of a possible pattern to these interviewees' judgements concerning the ownership of IP generated by academics. The two who had worked in industry for a period espoused the view that IP should belong to the employer; conversely, one of the two who had had an exclusively academic career espoused the view that the IP should belong to the academic(s) who generated it, while the other felt that it was immaterial who owned it, as long as both parties shared equitably in the proceeds.

When asked why they held the view which they had articulated, some interviewees gave two or even three reasons, as Figure 190 reveals. Upon examining these reasons, it was felt that they fell into almost as categories as there were reasons. These particular interviewees from York explained their views on the ownership of IP in terms of

- * provision of the necessary infrastructure;
 - * the locus of direction in academic research,
 - * the inconsequence of either party owning it,
 - * the two parties' potential to exploit,
 - * the income potential;
- and/or
- * who benefitted most from the resulting reputation

10.6.4 Protecting Intellectual Property Generated by Academics

The interviewees were asked whether they agreed with the broad concept of "protecting" IP where academic research discoveries were concerned. In one case, it proved necessary to explain what was meant by "protecting" IP, since the interviewee in question was not familiar with the terminology. As Figure 191 shows, two of the three interviewees at York who answered this question reported that they were in favour of the broad concept, while one was conditionally in favour. Each gave a reason for the view expressed. As we can see from Figure 192, these reasons fall into two distinct categories. Support for the broad concept of "protecting" IP was explained by these particular interviewees from York in terms of.

- * the anticipated financial gain,

while qualified support was explained in terms of

- * the potential cost/benefit.

Next, the interviewees were told that, as employers UK universities are under no obligation to file a patent application on IP generated by academics; they can choose to "protect" it by treating it as secret know-how. They were then asked how they felt about

treating academic research discoveries as secret know-how. It became clear from the ensuing discussion that two of these interviewees did not know that if they notified their university of potentially exploitable IP, the university had the legal right to insist that it should be "protected" by keeping it secret. Upon reflection, as **Figure 193** indicates, all four interviewees at York accepted the idea of treating academic research discoveries as secret know-how, provided certain conditions were fulfilled. Two felt that discoveries should only be kept secret for short periods, one specified a maximum of six months, basing this on the university's rule concerning the maximum length of embargoes on PhD theses; the other felt that secrecy should not extend beyond a year. The third thought that secret know-how was acceptable in engineering disciplines but not in science disciplines. The fourth was prepared to accept "protection" by secret know-how for discoveries which were of benefit only in certain, highly specific contexts, rather than of more general benefit. We might categorise these conditions as:

- * time-centred;
- * discipline-centred,
- or * application-centred.

Asked whether they thought patenting or secret know-how was preferable as a means of "protecting" inventions, three said that patenting was preferable; as **Figure 194** shows, just one felt that patenting was not necessarily preferable.

In view of the fact that UK universities are under no legal obligation to file a patent application on IP generated by academics, that they can choose to "protect" it by treating it as secret know-how, the four interviewees were next asked who actually decided whether and how to protect IP generated by academics at York. As we can see from **Figure 93**, two knew that the university had no policy *vis-a-vis* this question, so that

by default, those concerned made these decisions; the other two guessed that this was what would happen. Figure 94 shows that two (the first two) were ambivalent about this state of affairs, whereas the other two felt it was the best arrangement. Asked why they held the view they had expressed, all four gave a reason. As Figure 195 reveals, these particular interviewees from York explained their attitude in terms of

- * a perceived onus to consult;
- * academic freedom,
- or * pragmatism

It is interesting to compare interviewees' opinions on questions like who should make the final decision about whether and how to "protect" IP and whether inventions should be "protected" by treating them as secret know-how with their opinions on who should own IP generated by academics. As we have seen, two of the four said they felt that the university should own such IP, both were ambivalent about the university's lack of policy *vis-a-vis* the final decision as to whether and how to "protect" this IP - so that, by default, this decision would be made by the academic(s) concerned. At the same time, both accepted the idea of "protecting" IP by treating it as secret know-how. The interviewee who advocated joint ownership of IP was happy about the university's lack of policy *vis-a-vis* the final decision as to whether and how to exploit such IP. This particular interviewee was prepared - under certain circumstances - to accept the idea of "protecting" IP by treating it as secret know-how. The interviewee who felt that it did not matter who owned the IP was also happy about the university's lack of policy *vis-a-vis* the final decision as to whether and how to exploit such IP - because, by default, the decision would be made by the academics concerned.

The interviewees were next asked a series of questions designed to explore their attitude to the logistics of "protecting" IP by patent. They were informed that York had no policy *vis-a-vis* bringing in a patent agent, with the result that the academic(s) who generated the IP usually had to write the patent specification themselves, unless the department concerned was prepared to fund the cost of a patent agent. This information was received without comment by two interviewees; however, the third remarked that the university should surely bring in a patent agent from the outset, while the fourth volunteered the information that the commercial arm of his department invariably brought in a patent agent to write the patent specification on behalf of the member of staff concerned.

The other three interviewees were then asked how they would respond to a member of their staff who asked for a temporary reduction in his/her workload, in order to concentrate on writing the patent specification. As Figure 96 shows, one was not prepared to entertain the idea, whereas one was prepared to consider it and the third said that he would be prepared to do something to help anyone on his staff who was trying to write a patent specification. Each was asked what made him respond in the way he had. As we can see from Figure 196, the reasons given seemed to fall into three distinct categories - as many categories as reasons. These particular interviewees from York explained their attitude to temporarily reducing the workload of a member of staff in terms of.

- * the perceived nature of the task;
- * departmental flexibility;
- or * perceived characteristics of the patent.

It is interesting to compare these interviewees' preparedness to help members of staff writing patent specifications with their views on the ownership. We might have expected those who felt that ownership should be vested in the academic(s) who generated the IP to

be less prepared to help than those who felt that ownership should be vested in the university. However, there is no such association, indeed, there appears to be no pattern at all to interviewees' attitudes.

10.6.5 Entrepreneurially Exploiting Intellectual Property Generated by Academics

The interviewees were asked a series of questions designed to elicit their views on entrepreneurially exploiting "hard" IP generated by academics, instead of routinely licensing or assigning it to an existing company. This proved to be one of the more difficult sections of Questionnaire C to administer and it is correspondingly difficult to analyse. Three of the four interviewees at York based their opinions on "knowledge" of specific enterprises, usually companies which had spun out of the university; that is to say, they were not speaking hypothetically. However, it transpired that two of them did not really understand the difference *in principle* between wholly-owned university companies, joint ventures with members of the academic staff and independent academic spin-out companies. In another case it transpired - after lengthy discussion - that even though the interviewee in question had a good *in principle* grasp of the difference, he was not able to distinguish the difference *in practice*. His views were based on a mistaken categorisation of the university's spin-out companies. He thought, for example, that a joint venture was actually an independent spin-out company. Only one interviewee had a clear grasp of the different entrepreneurial scenarios both *in principle* and *in practice*. As a result of this confusion, the interviewer became so concerned to establish what kind of entrepreneurial scenario they were actually talking about that on occasion she paid insufficient attention to ascertaining their attitude to the entrepreneurial scenario she had asked about, or insufficient attention to ascertaining the reasons for their attitude - particularly their reasons for approval/qualified approval for entrepreneurial exploitation of

"hard" IP *per se*

As a result, the investigator has less confidence in the attitudes detailed in **Figure 99** than she would wish, in some cases, it is possible that an attitude expressed by an interviewee related to a different entrepreneurial scenario to the one to which it appears to relate in the transcription. For this reason, the investigator made no systematic attempt to relate the reasons they gave for their attitudes to a particular entrepreneurial scenario, preferring to analyse the reasons as a group.

Upon examination, the reasons they gave appeared to fall into seven distinct categories, as **Figure 197** reveals. These particular interviewees from York explained their views on entrepreneurially exploiting "hard" IP in terms of:

- * the income thought to be generated,
- * the entrepreneurs' fitness for the task,
- * associated conflicts;
- * perceived third-party benefit;
- * the market;
- * reputation;
- and/or * issues related to control.

The interviewees were asked for their views on three mechanisms by which academics could exploit "soft" IP: personal consultancy, commercial arms of departments and various types of spin-off company.

As **Figure 101** shows, these particular interviewees from York felt that extensive consultancy would have a definite affect on the academics concerned. Three of the four

felt it would have a negative impact, while another three said that it could also have a positive impact. Asked to give examples of the kind of positive or negative impact which extensive consultancy might have, between them the four interviewees cited nine examples. As we can see from Figure 198, the examples they gave seem to fall into four categories. These particular interviewees from York felt that extensive consultancy would have an affect on:

- * the academic's research;
 - * the academic's students;
 - * the academic's access to one thing or another,
- and/or
- * staff recruitment.

Of course, this is just one set of possible categories for the examples given by these interviewees. We might equally have employed the categories individual, collective and wider community to group them. If we had, we should have observed that of the nine examples given, none was concerned with the impact of extensive consultancy on the *individual* academic, and only three were concerned with its impact on what might be termed the academic *collective*. None was concerned exclusively with the wider community, either. The remaining six could be categorised as concerned with both the academic *collective* and the wider community.

The interviewees were next asked whether they agreed with their university's policy regarding the amount of time per week/month/year members of staff were allowed to devote to personal consultancy. As Figure 199 shows, although York imposed no time limit, only two of the four interviewees agreed with this policy. Another felt it would be useful to have guidelines in this respect and only one was in favour of having a time limit. This particular interviewee had already imposed a local limit of 20 days per year in his

department, since he felt that some members of his staff had abused the university's trust in this respect. The two who were against a time limit suggested that the imposition of one would militate against openness - and it was essential for the HoD to know what kind of consultancy members of staff were doing. The interviewee who favoured the introduction of guidelines was deterred from an absolute limit by the observation that it was difficult to reach a consensus across the university on the purpose and value of consultancy.

Next, the interviewees were asked a series of questions designed to elicit their views on staff exploiting "soft" IP via a commercial arm of the department. Only two of the four HoDs reported that a commercial arm had been established in their department; in fact, two commercial arms had been established in one department and one in another. The latter dated from the late 1970s, while the former were both children of the "entrepreneurial" 1980s. As Figure 200 shows, the only similarity between them was that all three had their own, dedicated staff. There were significant differences between them - most notably the locus of the initiative to found them, their accommodation and their financial *modus operandi*. Only one - the oldest - was entirely self-funding. Another was receiving direct financial support from its host department - in the form of start-up capital, plus the director's salary; this was intended to be for a limited period only, until the commercial arm was sufficiently well-established to repay the start-up costs, which included smart new premises. The third had received both indirect financial support from the host department and direct financial support from the university centrally. The former took the form of rent-free accommodation and free use of equipment/instrumentation, while the latter took the form of bridging funding for salaries between contracts. The former arrangement developed by default, the latter by way of crisis management - until both the university and the host department decided independently to cease providing support - whereupon the commercial arm became an independent academic spin-off.

company.

In all three cases the host department perceived there to be benefits other than direct financial benefits arising from the activities of the commercial arm. As Figure 201 shows, we might categorise those which were mentioned as:

- * enhancement of reputation;
- * the sprat to catch the mackerel;
- and * a teaching aid

Two of the commercial arms had also caused considerable controversy in the host department. As we can see from Figure 202, we might categorise the grounds for controversy mentioned as:

- * perceived opportunity costs;
- * perceived distractions;
- and * resentment

The two HoDs whose departments had no commercial arm were asked why none had been established. As we can see from Figure 203, we might categorise the reasons they gave as:

- * the perceived inutility;
- and * the blurring of the divide between department and commercial arm.

Where exploitation of "soft" IP by means of a company of one sort or another is concerned, interviewees were simply asked whether they made a distinction - when formulating their views on the various entrepreneurial scenarios - between academics who founded or were involved with "hard" companies and those who founded or were involved

in "soft" companies. Given that the data on interviewees' views of academics founding or becoming involved in various types of "hard" companies are of questionable value, this is not the most helpful approach to the problem. Suffice it to say that three interviewees felt there were no grounds for distinguishing between academics who founded or were involved in "hard" companies and those who founded or became involved in "soft" companies, while one thought there were. The latter observed that it would be far more difficult for a "soft" company to attract sufficient start-up capital to allow the academic concerned to buy out at least part of his time and the department to use the sum paid to buy in a part-time lecturer.

10.6.6 Support for Entrepreneurial Academics

The HoDs were asked a series of questions designed to ascertain the extent to which would-be academic entrepreneurs in their department might be given practical support to help them in their entrepreneurial endeavours.

Questionnaire C focussed on four different mechanisms for giving would-be academic entrepreneurs time to devote to business start-up:

- i) a formal reduction in or rescheduling of the academic's normal workload for a limited period;
- ii) a part-time contract for a limited period,
- iii) complete leave of absence for a limited period;
- iv) an extension to a previously agreed period of absence, where it has taken longer than anticipated to take a spin-off company to the point where the academic can reduce his input and being forced to return prematurely at the end of an agreed period of absence could be critical to the success of the company.

At the time it was the university's policy to leave to the discretion of the relevant HoD the amount of time which academics might devote to entrepreneurial activities and the mechanism for creating that time. As Figure 204 shows, where one mechanism was concerned, there was complete unanimity, there were discrepancies in the approach of these particular HoDs from York where other mechanisms were concerned, however. At the time the interviews were conducted, would-be academic entrepreneurs in all four departments could not have counted on persuading their HoD to temporarily reduce or reschedule some of their primary academic commitments while they strove to start their company - though none of the HoDs refused outright to entertain the idea. There was less unanimity in relation to part-time contracts for an agreed period, either in principle or practice. Entrepreneurial academics in one department could have been sure of persuading their HoD to back proposals for a temporary part-time contract, their colleagues in the other three departments could not have counted on their HoD doing so, however. Where complete leave of absence for an agreed period was concerned, this divergence of approach was even more marked. While entrepreneurial academics in two departments could have been sure of persuading their HoD to back proposals for complete leave of absence for a limited period, their colleagues in the other two departments could not have counted on their HoD doing so. Figure 204 reveals even a greater discrepancy in these HoDs' approach to the question of supporting an extension to a previously agreed period of absence, where it had taken longer than anticipated to take a spin-off company to the point where the academic could reduce his input, and being forced to return prematurely at the end of an agreed period of absence could be critical to the success of the company. Academic entrepreneurs in one department could have been sure of persuading their HoD to back their request; their colleagues in two departments could not have counted on this, however, and in the fourth department, such requests would probably have been flatly rejected.

On the face of it, this would appear to be a fairly significant finding. It suggests that effectively HoDs in some science or engineering departments would either inhibit staff from founding/co-founding a company to entrepreneurially exploit IP arising from their research or, at the very least, inhibit the rapid growth of the company by limiting the time which the would-be academic entrepreneur could devote to it. In the same way, they would also inhibit the growth of wholly-owned university companies, set up to exploit IP generated by a member of their staff. Up until the end of the 1980s many HoDs at York seemed to hold office indefinitely. Towards the end of the 1980s, however, a significant number of HoDs who had been in office for a decade or more relinquished office - including two of those interviewed in the course of this investigation. Of course, from the perspective of this study (not to mention the perspective of would-be academic entrepreneurs) this raises questions as to the approach of these HoDs' successors. It is also debatable whether, having been refused by one HoD, would-be academic entrepreneurs - particularly junior members of staff - would be prepared to grasp the nettle and broach the subject with the next. An alternative strategy might be to set up and run the company clandestinely, which is unlikely to be the optimum solution from either the department's, the academic's or the company's perspective.

Notwithstanding the move away from indefinite terms of office at York, it is worth examining the reasons cited for not being prepared to create a window of time for academics to devote to business start-up by employing certain mechanisms. We need to establish whether they are subjective or objective - a matter of the HoD's idiosyncratic *Weltanschauung*, perhaps, or a matter of obstacles, surmountable or insurmountable. Similarly, it is important to examine the conditions imposed by some HoDs, which, if fulfilled, would tip the balance in favour of the would-be academic entrepreneur.

In fact, only one HoD flatly refused to entertain the idea of creating a window of time - by one particular mechanism, namely extending a previously agreed period of absence. This particular HoD volunteered the information that he approved of the university's recent relaxation of its previously rigid approach to extending previously agreed periods of absence, suggesting that it was not unreasonable for staff to spend upto, say, five years working elsewhere. However, in his view, establishing a company to exploit one's research discoveries was inappropriate use of time; it should be spent on new research (or research-oriented activities such as learning new techniques), not the exploitation of completed research. Three of the four HoDs who gave conditional support for temporarily reducing or rescheduling a would-be academic entrepreneur's normal workload imposed conditions which we might categorise as a *quid pro quo*. For one the *quid pro quo* took the form of making up the following year the work from which they were relieved. The other two omitted (advertently) to specify what form the *quid pro quo* should take; one indicated that the **department** should benefit from the *quid pro quo* and that this should be enshrined explicitly in an agreement with the university; the other said that both the **department** and the **individuals** shouldering the extra work should benefit from the *quid pro quo* - which should be made as explicit as possible, he added that the *quid pro quo* need not take the form of money. The fourth made his support conditional upon the perceived merit of the entrepreneurial venture and widespread departmental support for it. Two of the three HoDs who conceded that they might support an application for a part-time contract or complete leave of absence for an agreed period pointed out that York's resource allocation model meant that they would not be allowed to keep the salary savings and use them to pay for teaching cover; as a result, their support had to be conditional upon widespread departmental support for shouldering the extra work. The other made his support conditional upon recruitment difficulties being overcome. Where complete leave of absence was concerned, one of the two HoDs who referred to not being able to keep the

salary savings felt that he would have a better chance of keeping them if a member of staff was absent altogether for a period. However, another two were clearly not so sure of this, since they made their support for extending previously agreed periods of absence conditional upon retention of salary savings.

Since no other HoD raised this kind of *philosophical* issue, the perception that extended leave of absence for the purposes of company start-up is an inappropriate use of time may be a department-specific barrier - possibly a function of the HoD's idiosyncratic *Weltanschauung*, or the ethos of the department or the discipline. Whichever it is, it is probably fair to categorise it as a subjective barrier. The only other philosophical issue raised was the concept of would-be academic entrepreneurs undertaking to provide some kind of *quid pro quo* in exchange for the window of time they sought. Three out of the four HoDs introduced this concept, which may suggest that it is not a department-specific concept. Where the other conditions imposed were concerned, they were all preoccupied with *practicalities* such as recruitment difficulties and how the department could cope with the extra work arising out the employment of one mechanism or another to create a window of time for an entrepreneurial member of staff. While there is a common thread here, it is probably appropriate to characterise many of the conditions as department-specific. Recruitment difficulties certainly fall into this category, this is a function of the discipline concerned and we may presumably regard this as an objective barrier to creating a window of time for entrepreneurial academics to devote to business start-up.

10.6.7 Incentives and Disincentives

The interviewees were asked a series of questions designed to ascertain their awareness of various incentives operating at York in relation to the exploitation of IP, and their attitude to the incentives in question.

Let us look first at the exploitation of "soft" IP via personal consultancy - focussing initially on the way the university treated the income earned by academics in the process. As chapter 8 revealed, during the 1989-90 session, when the fieldwork was undertaken, York was one of the five participating universities which neither imposed an earnings limit on the income from personal consultancy nor took a flat-rate or percentage cut. As we can see from Figure 108, all four HoDs interviewed at York were aware of the university's approach in both respects. Figure 109 shows us, furthermore, that all four agreed with the absence of an earnings limit, while three agreed that the university should not take a cut of academics' income from personal consultancy; one was ambivalent about this, however. Figure 205 details the reasons given by three interviewees for their views. Efforts to group and characterise those reasons were not entirely successful, since each seemed to constitute a separate category in itself. These particular HoDs explained their viewpoint in terms of.

- * the need for transparency,
- * illogicality,
- and * staff motivation

Let us look now at the impact of personal consultancy on promotion at York. Chapter 8 indicated that in 1989-90, when the interviews were conducted, York's promotion criteria took no account of consultancy activity. We can see from Figure 111 that all four HoDs were aware that this was the situation. Figure 111 also shows us that three of the four felt that personal consultancy was unlikely to number among the factors taken into account by the promotions committee, whereas one lone interviewee felt that it was likely to count.

Interestingly, as we can see from **Figure 112**, these numbers are reversed when it comes to the interviewees' own attitudes to the impact of personal consultancy on promotion. That is to say, three felt that it should number among the factors taken into account, while one argued that it should not. **Figure 206** details the reasons given by three of the four for their views. Efforts to group and characterise them were not entirely successful, since once again, each reason seemed to constitute a separate category. Where promotion was concerned, these particular interviewees saw personal consultancy as:

- * appropriate to their discipline,
- * difficult to evaluate;
- or * part of an alternative reward system

Let us turn now to the exploitation of "hard" IP by licensing/assigning it to one or more existing companies. **Figure 114** indicates the extent to which the four HoDs interviewed were aware of their university's policy *vis-a-vis* the distribution of income from the exploitation of IP. As we can see, all four were aware in principle that the university shared the income from royalties, option fees *etc* with the academic(s) concerned, but only one could quote the sliding scale accurately, even though it had been introduced and publicised shortly before the interviews were conducted. Significantly, perhaps, this particular HoD was himself an academic entrepreneur and his company was in the process of exploiting IP generated within the department. **Figure 115** shows us that the four interviewees had divergent views about how effective an incentive income sharing was when it came to encouraging members of staff to "flag" potentially exploitable IP: two felt it was an effective incentive, one was ambivalent and one regarded it as ineffective. **Figure 207** details the reasons given by the four for their views. Efforts to group and characterise them led to the positing of three categories. These particular HoDs explained

their views in terms of

- * a purely hypothetical reward,
- * a just reward,
- * orientation.

Let us look now at the impact of patents, licenses *etc* on promotion. As chapter 8 revealed, in 1989-90, when the interviews were conducted, York did not have a formal policy on this, nor was there any indication that the university had started to move informally in the direction of including patents, licenses *etc* in the criteria taken into account by the promotions committee. We can see from Figure 117 that although two of the HoDs interviewed were aware of this, the other two were not, one simply did not know what the university's policy was *vis-a-vis* patents, licenses *etc* and the other believed (erroneously) that they were listed among the criteria to be taken into account. Despite the fact that patents, licenses *etc* were neither explicitly listed nor was there any evidence that the university had started to move informally in the direction of taking them into account, Figure 117 shows us that one HoD believed they would be taken into account in practice, since they were now listed in the Vice-Chancellor's Annual Report. However, two felt they were unlikely to be taken into account in practice. Figure 118 indicates the interviewees' own attitude to the impact of patents, licenses *etc* on promotion. As we can see, two felt they should be taken into account, while one was ambivalent. Figure 208 details the reasons given by two of them for their view. Attempts to categorise them suggested that one was in favour of taking patents, licenses *etc* into account on grounds of their

- * value to the university,

while one was ambivalent on the grounds that this was

- * a discipline-limited activity.

Let us turn now to the entrepreneurial exploitation of IP - whether the IP in question is "hard" or "soft". Chapter 7 revealed York to be one of the most positively disposed of the nine universities towards academic spin-off companies. Moreover, in 1989-90, when the fieldwork was undertaken, York neither imposed an earnings limit nor took a percentage of academics' personal income from director's fees, dividends, sale of shares or selling on the company itself *etc.* However, Figure 120 shows us that at least one of the four HoDs interviewed was unaware of this. We can see from Figure 121, though, that having been told of the university's approach to the question of the income earned by academics from the entrepreneurial exploitation of IP, all four agreed with it. Figure 209 details the reasons given by the four for agreeing with their university's approach. Efforts to group and characterise them yielded three categories. These particular HoDs explained their position in terms of.

- * avoiding disincentives;
- * parity;
- and/or * other, preferable mechanisms for benefitting the university.

Where promotion is concerned, chapter 8 revealed that although academic entrepreneurship is not explicitly mentioned in the promotion criteria, informants from York's administration suggested that in practice it probably would be taken into account by the promotions committee, all other things being equal. Figure 123 shows us that at least three of the four interviewees were aware that academic entrepreneurship was not explicitly mentioned in the promotions criteria. It also shows us that at least one of them felt that this was unlikely to be taken into account in practice, while another was uncertain

how it would be regarded by the promotions committee

The interviewees were asked whether they themselves felt that the entrepreneurial exploitation of IP should number among the factors taken into account when considering applications for promotion. We can see from Figure 124 that at least three of the HoDs interviewed felt that it should be taken into account. Figure 210 lists the reasons given by the three. Efforts to group and characterise them yielded two categories. These particular HoDs felt that the entrepreneurial exploitation of IP should count towards promotion on grounds of:

- * the benefit to the university,
- or * the overly narrow promotion criteria which existed to date.

Cross-Case Analysis

10.7 Cross-Case Analysis

10.7.1 Introduction

In section 10 1 the reader was reminded that the questionnaire which was administered to Deans and/or HoDs, Questionnaire C, was designed to ascertain their awareness and experience of current IP policy and their attitude to it. The four case-by-case analyses presented the relevant findings for each university under seven principal headings for ease of comparison. The cross-case analysis will adopt the same structure. Accordingly, sub-sections 10 7 2 to 10 7 8 will focus on the removal of the BTG's monopoly and the response to the Kingman letter, identifying IP generated by academics, ownership of IP generated by academics, "protecting" IP generated by academics, entrepreneurially exploiting IP generated by academics, support for entrepreneurial academics, and incentives and disincentives.

10.7.2 Removal of the BTG's Monopoly and Response to the Kingman Letter

(i) Awareness of the Removal of the BTG's Monopoly and the Research Councils' Offer

Data relating to the 25 Deans and/or HoDs' awareness of the removal of the BTG's right of first refusal - sometimes referred to as a "monopoly" - were presented in Figure 72a. We can see at a glance that 80 per cent claimed to have been aware of the removal of the BTG's monopoly at the time, while only 65 per cent claimed to have been aware at the time of the Research Councils' offer to all UK universities to assume the rights and responsibilities previously enjoyed by the BTG. We can also see at a glance that there were marked differences between the four universities, particularly where awareness of the removal of the BTG's monopoly was concerned. All the interviewees at Hull claimed to have been aware of this at the time compared to only half of those at York. If we rank the four universities in descending order of awareness, we obtain the following two rank

orders

Removal of BTG's Monopoly Research Councils' Offer

1	Hull	1	Liverpool
2	Strathclyde	2	Strathclyde
3	Liverpool	3	Hull
4	York	4	York

As chapter 8 revealed, none of the nine participating universities seems to have *formally* imparted these pieces of information verbally, *eg* via seminars or presentations. Instead, those which bothered to communicate this information relied exclusively on written information and informal verbal communication. Data relating to the interviewees' own recollections of how they learned about the removal of the BTG's monopoly and the Research Councils' offer were presented in Figure 72b. Even though it was shown in the case-by-case analyses that some interviewees' recollections were erroneous, it is nonetheless interesting to note that some information sources cited (*eg* committees, the IL office and possibly the media) were verbal, rather than written. This would tend to support the investigator's assumption that information dissemination via verbal media is important, and that dissemination via both media is probably more effective than via one or the other.

The marked differences in awareness exhibited by these informants are not explained by some universities *informally* providing verbal as well as written information, however. It seems more likely that other factor(s) may be at work here. It is worth noting, for instance, that despite the fact that none of Hull's interviewees learned about these two events by design, they were all aware of the removal of the BTG's monopoly - whereas fewer were aware of the Research Councils' offer. We might reasonably speculate that Hull's reputedly widespread scorn for the BTG, occasioned by the NRDC's rejection of the opportunity to exploit liquid crystals, goes part of the way to explain the level of

awareness reported - that is to say, the information struck a particular chord at Hull

Conversely, it may be worth noting that York's ILO commented that he felt that the BTG and the University were barely acquainted, since York was an outpost of a large territory which the BTG's northern representative covered from Manchester. In other words, there may be situation-specific factors at work in individual universities which predispose members of the academic staff to register and retain this information - or not to register and retain it. This suggests that those responsible for disseminating this kind of information need to devise a "peg" to hang it on which will strike a chord with their own particular staff, rather than slavishly follow "best practice" guides, so many of which seem to have been produced in the late 1980s.

(ii) Interviewees' Own Attitudes

Data on the interviewees' own attitudes at the time to the removal of the BTG's monopoly and the Research Councils' offer were presented in Figure 73. Again, we can see at a glance that although none admitted to having been against these changes, only 56 per cent were actually in favour of them. However, if we adjust for those who were unaware of either event at the time and those for whom no data were obtained, then this rises to 82 per cent in favour, by the same calculation, 18 per cent were indifferent. On the basis of this same adjustment, 100 per cent of the interviewees at Liverpool and York claimed to have been in favour, while only 75 per cent of those at Hull and just 60 per cent of those at Strathclyde did so, surprisingly, perhaps, we find the greatest incidence of indifference among interviewees at Strathclyde, too.

The case-by-case analyses detailed the reasons for the interviewees' support for/indifference to the removal of the BTG's monopoly and the Research Councils' offer in Figures 74, 126, 155 and 183. A comparison across all four cases reveals that of the

five categories proposed, one (expertise) features in all four cases, while two (relevance, control) feature in two (different) cases apiece. Figure 211 presents the aggregate of Figures 74, 126, 155 and 183 for ease of analysis. Judging by replication and the number of "mentions", expertise is the most robust of these three categories, eight (47%) of the reasons given by the 25 interviewees fell into this category. Relevance is also fairly robust, five (29%) of the reasons given fell into this category. Control appears to be somewhat less robust, however, only two (12%) reasons fell into this category. Although there were evidently differences between the four universities, they are not particularly marked, however. We are no closer to an explanation of why such a high proportion of interviewees at Strathclyde should be indifferent to the removal of the BTG's right of first refusal and the Research Councils' offer.

Perhaps the most interesting aspect of these categories is the "dimensions" they exhibit. For instance, reasons grouped under the category expertise range from a negative view of the university's expertise through cautiously optimistic views of it to the view that the university was just as capable of exploiting IP as the BTG and on to the view - based on reputation or experience - that the BTG had not been so good at exploiting university IP in any case. Similarly, reasons grouped under the category relevance range from belief that the Research Councils' offer was *irrelevant* to the informant's *discipline* to belief that the rights and responsibilities offered by the Research Councils would enable the *university* to become more *relevant*. We see a similar difference in focus (this time department *versus* university) in the reasons grouped under the category control. This tremendous diversity of views on the same broad theme reveals the difficulties which these particular universities probably faced (unwittingly) in gaining acceptance in the academic community for having assumed the rights and responsibilities previously enjoyed by the BTG. It is evident that these universities should have taken nothing for granted, should have been

prepared to encounter a whole spectrum of views - and should have marshalled a range of arguments to support their assumption of those rights and responsibilities

(iii) University's Motive in Accepting the Research Councils' Offer

The case-by-case analyses sought to establish why the interviewees thought that their university had decided to accept the Research Councils' offer. The relevant data were presented in Figures 75, 127, 156 and 184. A comparison across all four cases shows us that one category (financial gain) features in all four cases, while another (expertise) features in three and a third (relevance) features in two cases. The remaining five categories (mission, enterprise, control, contact with industry and logic) feature in only one case apiece. How should we interpret this finding? Do these Deans and/or HoDs have genuinely different perceptions of their university's motive, or is it possible that the groupings and characterisations (*ie* the categories) proposed are not the most appropriate or useful? Examination of the reasons encompassed by both the single-case and the replicated categories uncovered no more insightful or economical way of regrouping or recharacterising them. Moreover, judging by the number of "mentions", mission and enterprise are certainly appropriate and useful categories, in so far as over half the interviewees at Strathclyde imputed to their university motives which were categorised in these two ways. In fact, these are the two *dominant* categories where the perceptions of these particular interviewees from Strathclyde are concerned, judging by the number of "mentions", the other three should probably be regarded as weak categories. However, although two interviewees from Strathclyde imputed motives categorised as financial gain, compared to only one "mention" each for expertise and control, it is worth noting that motives categorised as financial gain were the *last* motive imputed by each of the interviewees concerned, rather than the first. To put this into perspective, financial gain was not only by far the most dominant category at Hull and Liverpool, but the motives

categorised as financial gain were the *first* or *only* motives imputed by all the interviewees concerned. These observations give us a pointer as to the usefulness and appropriateness of these single-case categories. It seems likely that the categories proposed for the motives imputed by HoDs and Deans at Strathclyde are appropriate and useful, and that they reflect genuine differences in perceptions of their particular university's motives. This assessment should probably extend to control, too, even though only one imputed motive was categorised in this way, for during the course of the fieldwork the ILO at Strathclyde made several references to the university's long-standing desire for control over the exploitation process, it would not be surprising if this attitude rubbed off on the academic staff who came into contact with the ILO. Similarly, where Hull is concerned, we should probably regard the single-case category contact with industry as appropriate and useful, for during the course of the fieldwork the ILO mentioned that Humberside had a relatively small industrial base which made it difficult to make contact with industry. This was also mentioned by a number of HoDs interviewed at Hull.

What should we conclude from this analysis? Figure 212 presents the aggregate of Figures 75, 127, 156 and 184 for ease of analysis. Judging by replication and the number of "mentions", the category financial gain is by far the most robust, it encompasses fifteen (47%) of the motives imputed to their university by these 25 interviewees as a group. Mission and enterprise are the next most robust in terms of the number of "mentions", for each encompasses four (13%) of the motives imputed, however, these are both case-specific categories, as we have seen. Judging by replication and the number of "mentions", the other categories are considerably less robust.

As we have seen, Strathclyde would appear to be atypical in so far as interviewees there felt that their university was primarily motivated by mission and enterprise rather than

financial gain. (York would also appear to be slightly atypical in so far as the interviewees there were hard pressed to imagine their university's motive, whereas motives were preferred without hesitation by interviewees in the other three universities.) How should we interpret this quite marked difference? One of the selection criteria detailed in chapter 6 was the relative severity of the cuts imposed by the UGC in the early 1980s. As we have seen, Hull was one of the universities most afflicted by the cuts, whereas Strathclyde was treated neither particularly harshly nor particularly leniently, and Liverpool and York were among the least afflicted. By the time the interviews were conducted, however, Hull had undergone a second period of financial difficulties, while Liverpool was confronting a period of financial stringency which manifested itself in the form of a jobs freeze and a moratorium on various spending heads. Since financial gain covered six (54%) of the motives imputed by interviewees at Hull and six (75%) of those imputed by interviewees at Liverpool, this may partly be explained by these two universities' financial situation at the time. However, it is worth considering whether there is not an element of naivety *versus* worldly wisdom at work here, too. Let us contrast Liverpool with Strathclyde, where only two (17%) of the motives imputed fell into this category. By 1989-90 Liverpool had tried to exploit relatively little IP, with the result that staff may have had unrealistic expectations of the income which might be generated from the exploitation of IP, if only it could be generated, identified and exploited. Strathclyde, in contrast, had earned significant sums for one particular piece of IP, but far less significant sums for the rest, which may have resulted in its staff having more realistic expectations. If we pursue this line of thought we find that this could account for the motives imputed by interviewees from Hull, for it became evident in the course of the fieldwork that rumours abounded about how much the university had lost by refusing to participate in the exploitation of liquid crystals, and how much the academic concerned - and other inventive academics - had gained from the exploitation of IP in which Hull had

refused to take an interest. In the course of being interviewed for this study, the academic most associated with the development of liquid crystals put a much lower figure on the losses sustained by Hull as a result of its refusal to take an interest in the exploitation of this technology.

Perhaps the most interesting aspect of these categories is the fact that if we compare them with the categories proposed for the interviewees' *own* reasons for being in favour of the transfer of rights and responsibilities from the BTG to their university, we find that financial gain does not figure among those categories. The only overlapping categories are expertise, relevance and control. This suggests that the interviewees had - or wished to portray themselves as having - non-pecuniary, primarily IP-oriented motives, whereas they saw - or wished to portray - their university as being preoccupied with mammon or political expediency.

10.7.3 Identifying IP Generated By Academics

(i) The Context in Which Commercially Exploitable IP Might Be Generated

The case-by-case analyses sought to elicit the views of Deans and/or HoDs on the context in which commercially exploitable IP might be generated in a university. It is pertinent to note that the interviewer did not define "intellectual property" before posing the question and most interviewees clearly interpreted this narrowly as meaning "hard" IP - manifested by "widgets" or processes, rather than in the widest sense, including "soft" IP - manifested by consultancy, contract research or even training opportunities. If this is a genuine reflection of their understanding of the phrase "intellectual property", the universities concerned should possibly consider educating their staff as to what exactly constitutes IP. On the other hand, it is worth noting that in Questionnaire C, these questions followed on directly after questions about the removal of the BTG's monopoly

and the Research Councils' offer; the BTG, of course, made no claims over the exploitation of "soft" IP and this may account for these interviewees' narrow interpretation. There again, it may be wrong to assume that a significant proportion of these interviewees was intimately *au fait* with the BTG's former remit

Figures 78 to 80 presented the data on the views of Deans and/or HoDs from the four universities on the context in which commercially exploitable IP might be generated in a university. We can see at a glance from Figure 78 that over two-thirds of the 25 interviewees felt that the generation of commercially exploitable (*ie.* in most instances "hard") IP was a function of individual disciplines - though one qualified his answer by observing that this was a matter of fact as opposed to potential. Figure 79 listed the disciplines which this majority felt were more or less likely to generate commercially exploitable IP at the time that they were interviewed, it is worth noting that many emphasised that they saw this as a *dynamic* rather than a static situation. Figure 80 detailed the factors which the minority felt influenced the generation of commercially exploitable IP. What these responses reveal is a marked divergence of opinion. The majority of interviewees regarded the possibility of generating commercially exploitable IP as a "given" - determined by the disciplines - or the fields within those disciplines - on which the staff of a university happen to have focussed. In a sense, we might say that these interviewees regarded the generation of commercially exploitable IP as a matter of chance - a serendipitous combination of being in the right sub-field of the right discipline at the right time. In contrast, a minority saw the generation of commercially exploitable IP as an outcome of research which is "creatable", with a will. This can be achieved by the university promoting the right ethos, being committed to excellence, maintaining sound physics and chemistry departments and ensuring that its research effort is organised in a non-compartmentalised way, since much IP is likely to be generated at the interface

between traditional disciplinary boundaries, in this context, one interviewee remarked that the movement towards "schools" should be welcomed. In addition, departments should recruit staff who are committed to research, who have or are prepared to develop a relationship with industry and who can demonstrate the ability to be enterprising or even entrepreneurial.

Figure 77 also reveals that in some universities a considerably higher proportion of interviewees subscribed to the discipline-specific view than in others. Those in York and Hull seemed particularly wedded to the notion that the generation of commercially exploitable IP was a "given", a function of certain disciplines, whereas around half of those in Liverpool and Strathclyde felt that the generation of commercially exploitable IP was a function of characteristics of individual members of staff or individual departments - or, a function of characteristics of the university as a whole - i.e. that the generation of commercially exploitable IP was "creatable", with a will. It is not clear why there should be this marked difference. It may or may not be pertinent to note that half/nearly half the interviewees in the two large universities felt that the context in which commercially exploitable IP could be generated was "creatable", whereas most/all of those in the small and medium-sized universities felt it was a "given". One wonders whether the notion of a "critical mass" of disciplines and sub-disciplines and the greater potential for local interdisciplinary collaboration has anything to do with these differences.

(ii) **Staff Awareness of Their University's Wish To Identify Potentially Exploitable IP**

The case-by-case analyses focussed on interviewees' estimates of how aware their own staff were of their university's wish to identify potentially exploitable IP. The relevant data were presented in Figure 80. We can see at a glance that ten (40%) of the 25 interviewees estimated their staff to be "semi-aware" or an equivalent characterisation. Of

course, three- or five-point scales often manifest a concentration on the middle point, so we should probably not be surprised to encounter that concentration here, too, unfortunately, interviewees' responses made it imperative to employ a five-point scale unless the investigator was willing to force their responses into fewer categories. One common technique for dealing with this problem is to exclude the middle point from the analysis. If we do this, we see that whereas six (24%) characterised their staff as "very aware" or "pretty aware", nine (36%) characterised their staff as either "unaware" or at best "vaguely aware". Moreover, five interviewees qualified their answer, remarking, for instance, that while staff capable of generating IP were very aware, the others were less aware, or that their staff were intellectually aware but not entrepreneurially aware, or that only the entrepreneurial members of their staff were very aware. Even if we take at face value the ten (40%) whose answers fitted scale point 3, from the government's and the Research Councils' perspective this is not a particularly encouraging finding, since these particular members of staff were deemed to be no more than "semi-aware".

It is evident from **Figure 80** that estimates of awareness vary somewhat from one university to the next. **Figure 213** converts the data presented in **Figure 80** into an aggregate estimation of the degree of staff awareness by university. We can see from this that as a group the interviewees from **Strathclyde** reported the highest estimated awareness, while those from **Liverpool** reported the lowest estimated awareness. Many of the interviewees spontaneously suggested why staff awareness levels were as they characterised them. The relevant data were presented in **Figures 81, 129, 158 and 186**. As we can see from these **Figures**, the number of reasons volunteered by interviewees from each university is inversely related to the aggregate estimation of awareness recorded in **Figure 213** - that is to say, interviewees in **Liverpool** volunteered the largest number of explanations while those in **Strathclyde** volunteered the smallest number. A comparison

across all four cases reveals that one category (publicity) features in all four, while three categories (orientation, type of research sponsorship and experience) feature in two (different) cases apiece. Three of the seven categories (relevance, organisation of research and controversy) feature in only one case - two in relation to Hull, one in relation to Liverpool. Figure 214 presents the aggregate of Figures 81, 129, 158 and 186 for ease of analysis. Judging by replication and the number of "mentions", publicity is by far the most robust category where this particular group of interviewees is concerned, five (31%) of the sixteen reasons volunteered fell into this category. On this basis, orientation is the next most robust, four (25%) of the reasons volunteered fell into this category. Type of research sponsorship and experience covered only two (13%) of the reasons volunteered, however.

Curiously, the HoD who suggested that awareness in his department was low because the commercial exploitation of research was not relevant to his discipline was not one of the 17 interviewees who thought that the likelihood of generating commercially exploitable IP was a function of the academic discipline! Conversely, even though eleven of the interviewees came from cost centres which were among those characterised as less likely to generate commercially exploitable IP - and a further eleven came from cost centres which were among those characterised as more likely to generate commercially exploitable IP, none of those interviewees cited the relevance of their discipline in seeking to explain awareness levels in their department. Thus, these categories may be considered reasonably heartening by the four universities concerned. They do not portray awareness levels as a "given", determined by the (perceived) relevance of the academics' discipline, rather, they suggest that awareness can be raised, that is it is possible to devise a series of tactics - informed by these categories - which link together into a comprehensive strategy to raise awareness. The key to this is clearly publicity in some form or another. publicity to

inform, to modify the orientation of staff where necessary, to counteract misconceptions (such as those of the interviewee who remarked that the degree of awareness in his department was low because nearly all the research was Research Council-funded), to stimulate and reinforce by example and to counteract negative experiences Rethinking the organisation of research may also help

(iii) Staff Attitudes to Being Asked to Flag Potentially Exploitable IP

The case-by-case analyses sought to establish whether, in view of the ratio of IL staff to academic staff, the interviewees thought their staff would take a positive or negative view of being asked to "flag" potentially exploitable IP The data for all four cases were presented in Figure 82 We can see at once that, interestingly, this five-point scale does not exhibit a concentration of responses in the middle point We can also see that 64 per cent of the 25 interviewees believed their staff would take a positive or reasonably positive view of being asked to "flag" IP, whereas 16 per cent thought their staff would have a neutral attitude and the remaining 20 per cent felt that their staff would take a "begrudging" or even an entirely negative view of being asked to "flag" IP. It is obvious that where these particular cost centres and faculties/schools were concerned, academics at Hull and Strathclyde were perceived to be the most positively disposed, while academics at Liverpool were perceived to be the most negatively disposed As the case analysis revealed, five interviewees at Liverpool volunteered the information that their staff would find it burdensome or financially suspect It is not clear why staff at Liverpool should find it any more burdensome or financially suspect than their colleagues in Hull or Strathclyde, though anecdotal evidence gathered in the course of the fieldwork suggests this may be connected with fairly negative views of the administration expressed by academics at Liverpool, many of whom referred to the (separate) building housing the administration as "Alcatraz" Whatever the reason, it is interesting to note that neither of

these two categories implies that the staff in question would take issue with the identification of IP *per se*, one encapsulates the notion that it would constitute unwelcome extra work, while the other takes issues with the university's motives in asking staff to "flag" IP

(iv) Proactive or Reactive Approach to Identifying Potentially Exploitable IP

The case-by-case analyses sought to establish whether the interviewees thought that the centre, perhaps through the IL office, should adopt a proactive or reactive approach to trying to identify potentially exploitable IP. The data for all four cases were presented in Figure 83. On this occasion there was no need to employ a five-point scale, with the result that we can see immediately that 18 (72%) of the 25 interviewees felt that the centre should take a proactive approach - though three (12%) qualified this by remarking that this was what should happen in an ideal world, in the real world they doubted whether it was achievable. Where these particular cost centres and faculties/schools were concerned, interviewees at Strathclyde and York were most in favour of the centre adopting a proactive approach, while those at Hull were least in favour of this approach.

All six interviewees who entirely eschewed the proactive approach gave one of two reasons, irrespective of the university from which they came: it was either an impractical proposition or it would be a waste of time. Those who were in favour of the university adopting a proactive approach had quite different views on what this should entail - so many views, in fact, that it proved impossible to categorise them meaningfully. Suffice it to say that the actions suggested ranged from strategic to tactical, from systematic to *ad hoc* and from assertive to diffident, some of the actions suggested seemed to occupy a position on not just one such spectrum but two or three simultaneously.

(v) **Fail-Safe Mechanisms for the Identification of Potentially Exploitable IP**

The case-by-case analyses sought to establish the interviewees' views on two systematic "fail-safe" mechanisms which might be employed to identify potentially exploitable IP - viz scrutinising research proposals and interim/final reports, and scrutinising drafts of papers. The relevant data were presented in Figures 84, 130, 159 and 187. For ease of analysis the aggregate data are presented in Figure 215. We can deduce from this that 72 per cent of the interviewees were against the idea of employing "fail-safe" mechanisms such as these. It is clear that they were marginally less ill-disposed towards the scrutinising of interim/final reports than research proposals or drafts of papers. Only 17 per cent were in favour of the idea of employing such "fail-safe" mechanisms - though a further 11 per cent were open-minded about it. Both of these groups were marginally better-disposed towards the scrutinising of interim/final reports than research proposals or drafts of papers. In fact, there seemed to be a consensus that the scrutinising of interim/final reports was the least contentious of these "fail-safe" mechanisms, while the scrutinising of research proposals was the most contentious. If we refer back to Figures 84, 130, 159 and 187, it is not difficult to deduce that the interviewees from Hull were the most amenable to these "fail-safe" mechanisms, while those from York were considerably less amenable. Interviewees from Liverpool were even less amenable, but those at Strathclyde were by far the least amenable - not one was in favour of the scrutinising of research proposals, interim/final reports or drafts of papers.

The case-by-case analyses sought to establish why so many interviewees rejected these "fail-safe" mechanisms. The relevant data were presented in Figures 85, 131, 160 and 188. A comparison across all four cases reveals that two categories (expertise, cost/benefit) feature in three, while one category (time) features in two cases. Three categories (confidentiality, strategy and bureaucracy) feature in just one case - the first two

in Strathclyde, the last in York. All three reasons given by interviewees at York fall into this last category. It does not seem appropriate to question whether this is an appropriate and useful category, since the reasons categorised in this way appear to convey a different message to, say, those categorised under time, the latter seem to imply that publication would be delayed, while the former seem to imply that academics could be deterred altogether from publishing. However, where strategy is concerned, it would not appear to be forcing things if the reason categorised in this way were recategorised under cost/benefit.

The revised aggregate data are presented in Figure 216 for ease of analysis. We can see that where this particular group of interviewees is concerned, their reasons for rejecting these "fail-safe" mechanisms fall into three dominant categories. Judging by replication and the number of "mentions", the single most robust category is expertise - *ie.* the lack of it; nine (33%) of the reasons given fall into this category. The next most robust is cost/benefit - *ie.* doubts about it; seven (26%) of the reasons given fall into this category. The next most robust again is time; six (22%) of the reasons given fall into this particular category. The other two (bureaucracy and confidentiality) are weak categories, covering just three (11%) and two (7%) reasons respectively. With the exception of interviewees from York, there do not appear to be significant differences between the views expressed by informants from the four universities; interviewees at York stand out in so far as the (single) reason each gave fell into the same category, whereas interviewees at the other three universities seem to have suggested a variety of reasons for rejecting these "fail-safe" mechanisms - indeed, in some instances, individual interviewees gave a variety of reasons.

The discussion engendered by this section of Questionnaire C led to particularly interesting findings. It transpired, for instance, that the vast majority of interviewees did not know that such mechanisms are employed by some large research-oriented universities in the United States and most claimed not to have considered the idea prior to these questions being posed. However, it also emerged that many departments had been forced to employ exactly the same or similar mechanisms with regard to research funded by industry, in order to comply with contractual conditions - yet, with one exception, none of the HoDs interviewed had considered employing such mechanisms in relation to research funded by sponsors who did not assert their right to ownership or use of any IPR arising. Moreover, although the questions were deliberately posed in a manner which did not imply who should actually scrutinise the proposals, interim/final reports *etc*, most interviewees assumed that the question related to the staff of the IL office. When asked to consider whether there might be some entity (such as the university research committee or the faculty/school/departmental research committee) which embodied the appropriate expertise, several interviewees conceded that one of these might offer a solution to the presumed lack of expertise of the staff of the IL office. Several - most notably at Hull - ended up by expressing enthusiasm for this idea. However, most felt that such entities would not, in fact, have the requisite expertise, the majority view was that the solution lay in encouraging research group leaders to employ such "fail-safe" mechanisms on a purely informal and voluntary basis, as a matter of course. It was also suggested that HoDs could reinforce this by addressing the question of IP at staff appraisal. No solution was preferred for departments where researchers were not organised into research groups, other than to encourage the researchers themselves to be self-policing.

10.7.4 Ownership of IP Generated By Academics

The case-by-case analyses sought to establish Deans' and/or HoDs' views on the

ownership of IP generated by academics. The relevant data were presented in Figures 86, 132, 161 and 189. For ease of analysis the aggregate data are presented in Figure 217. We can see at a glance that despite - or perhaps because of - the fact that many of these interviewees were unfamiliar with IP law, as a group they ended up expressing quite diverse views, given time to think about this question. Nonetheless, it is evident that nearly half (42%) felt that the university should own the IP generated by academics, while exactly half this proportion (21%) felt that the academic(s) concerned should own the IP they generated. A further four (17%) suggested that joint ownership was the appropriate solution. If we refer back to Figures 86, 132, 161 and 189 it is not difficult to deduce that there were fairly marked differences in the views expressed by interviewees from the four universities. Those in favour of the university owning the IP generated by academics were most prevalent at Liverpool and York and least prevalent at Hull and Strathclyde. Those advocating joint ownership were most prevalent at Liverpool and York and least prevalent at Strathclyde. Those in favour of the academic(s) concerned owning the IP they generated were most prevalent at Hull and least prevalent at York, where no-one favoured this approach. Those advocating a different approach (*eg* a flexible approach to ownership or the research sponsor owning the IPR) were most prevalent at Strathclyde and least prevalent at Hull and Liverpool.

The case-by-case analyses also sought to establish why these interviewees decided upon these particular views. The relevant data were presented in Figures 87, 133, 162 and 190. A comparison across all four cases reveals that two categories (infrastructure, locus of direction) feature in all four, while a further three (potential to exploit, motivation and inconsequence) feature in two cases apiece. Four categories (mission, morality, income potential and reputation) feature in just one case apiece - the first in Hull, the next in Liverpool and the last two in York. How should we interpret this finding? Do the Deans

and/or HoDs in these universities have genuinely different reasons for their views on the ownership of IP generated by academics or is it possible that the groupings and characterisations (*ie* the categories) proposed are not the most appropriate or useful? Examination of all the reasons given uncovered no more insightful way of regrouping or recharacterising them. Accordingly, the aggregate data from Figures 87, 133, 162 and 190 are presented in Figure 218 for ease of analysis.

Judging by replication and the number of "mentions", by far the most robust category is infrastructure, 13 (45%) of the 29 reasons given by this particular group of interviewees fell into this category. The next most robust is locus of direction, six (21%) of the 29 reasons given fell into this category. Notwithstanding the fact that they are replicated, potential to exploit, motivation and inconsequence appear to be relatively weak categories as far as this particular group of interviewees is concerned, only two (7%) of the reasons given fell into each of these categories. Similarly, income potential, morality, reputation and mission are weak categories, encompassing just one reason each. If we refer back to Figures 87, 133, 162 and 190, we find that the four universities seem to divide into two groups. The interviewees from Liverpool and Strathclyde present a fairly similar profile in both infrastructure is the dominant category, followed by locus of direction, all the reasons given by the interviewees concerned fall into just three categories. In Hull and York, in contrast, infrastructure is not such a dominant category and the reasons given by the interviewees concerned fall into a total of six categories, three of which are common to both cases and one and two (respectively) of which are case-specific.

These categories are particularly interesting for the extent of ignorance about IP law which they reveal. As outlined in chapters 2 and 7, the rationale underlying the allocation of ownership of employee inventions *etc* to the employer in UK IP law has nothing to do

with the provision of facilities or a supportive environment encapsulated in the category infrastructure - nor, indeed, anything to do with the concepts encapsulated in the category locus of direction. The underlying rationale derives from two related assumptions - firstly, if the IP is connected with the employee's work, the employer is likely to be in a far stronger position to exploit it than the employee, secondly, the employee should be prevented from jeopardising the business activities of the employer by offering the IP to a rival business. Only two interviewees, one from Hull, one from York, explained their views about IP ownership in those terms - namely those whose reasons fell into the category potential to exploit. However, whilst one was of the opinion that a university was better placed than its employees to exploit IP, the other challenged this view. He suggested that a university differs from other employers in that it does not have a comparable ability to exploit IP - a sentiment expressed by many UK universities, which nonetheless happily continue to assert their legal rights as employers.

Perhaps the most interesting aspect of some of these categories is the "dimensions" they exhibit. For instance, explanations grouped under the category infrastructure range from the view that the university indisputably provides the infrastructure without which the IP could not be generated, through the view that the extent to which the university provides the infrastructure varies from one piece of IP to the next, to the view that even if the university provides the infrastructure, no IP will be generated without the academics' ideas, and concludes that unless the university provides all the necessary infrastructure, it should not claim (sole) ownership. Similarly, the explanations grouped under the category locus of direction range from the view that there is no difference between academia and industry in the approach to research these days to the view that academics still work in a completely different (*ie.* self-directed) way. These different "dimensions" of categories common to *eg* Hull and York partly account for the differences between the cases, the

differences are not wholly explained by case-specific categories. In much the same way that these particular universities probably (unwittingly) faced difficulties in gaining acceptance in the academic community for having assumed the rights and responsibilities previously enjoyed by the BTG, they may also (unwittingly) face difficulties in gaining acceptance for their policy *vis-a-vis* the ownership of IP. Once again, it is evident that they should take nothing for granted, should be prepared to encounter a whole spectrum of views and should marshal a range of arguments to support their policy on IP ownership - whatever that policy is.

10.7.5 Protecting IP Generated By Academics

The case-by-case analyses sought to establish the interviewees' views on various aspects of the principle and practice of "protecting" IP generated by academics.

(i) The Broad Concept of "Protecting" IP Generated By Academics

Data relating to their views on the broad concept of "protecting" such IP were presented on a case-by-case basis in Figures 88, 134, 163 and 191. For ease of analysis the aggregate data from these four Figures are presented in Figure 219. We can see at a glance from this that, once the meaning of the question had been explained to them, 75 per cent of the 25 interviewees claimed to agree with the broad concept of "protecting" IP generated by academics. A further 4 per cent signalled their qualified agreement, while 12 per cent reported that they had no opinion on the subject. Thus, only 8 per cent disagreed with the broad concept of "protecting" such IP. If we refer back to Figures 88, 134, 163 and 191, we find fairly marked differences of opinion between the four universities, however - as expressed by the particular Deans and/or HoDs interviewed. Those at Hull were the most positively disposed to the broad concept of "protecting" IP generated by academics, while those at Strathclyde were the least positively disposed.

The case-by-case analyses sought to establish the reasons for the attitudes expressed by the interviewees. The relevant data were presented in Figures 89, 135, 164 and 192. A comparison across all four cases shows us that one category (financial gain) features in all four cases, while two (counteracting foreign competition and secrecy) feature in (the same) two cases. The remaining five categories (drawing the line, control, ignorance of objectives, inherent difficulties and cost/benefit) feature in just one case apiece. Again, the question arises: how should we interpret this finding? Do the interviewees in these universities have genuinely different perceptions of the value/implications of "protecting" IP generated by academics, or is it possible that the groupings and characterisations (i.e. the categories) proposed are not the most appropriate or useful? As we shall see, examination of these five categories did suggest a different way of grouping and characterising most, but not all of the reasons given. However, it was felt that the categories originally proposed should be retained, since at least one reason could not be accommodated by this new approach. Moreover, it was felt that these interviewees genuinely perceived a wide range of advantages and/or implications to attach to the concept "protecting" IP generated by academics. Accordingly, the aggregate data from Figures 89, 135, 164 and 192 are presented in Figure 220 for ease of analysis.

Judging by replication and the number of "mentions", by far the most robust category is financial gain, eight (40%) of the 20 reasons given fell into this category. The next most robust is apparently counteracting foreign competition - though this is considerably less robust, only three (15%) of the reasons given fell into this category. The remaining categories cannot really be described as robust in terms of replication and the number of "mentions". Nonetheless, they are of interest. Moreover, as indicated, it is quite possible to apply a different set of categories to the same reasons and derive different insights from these new categories. For instance, 19 of the 20 reasons ⁽⁹⁾ could be grouped and characterised in the following way:

- * UK-focussed [4];
- * university-focussed [8];
- * individual academic(s)-focussed [4];
- * advance of knowledge-focussed [3],
- * IP-focussed [4].

The figures in brackets indicate the number of "mentions", they total > 19 since some reasons fell into one or even two of these new categories simultaneously. If we adjust for duplication, we find that eight (35%) of these particular interviewees had a university-focussed perspective on the broad concept of "protecting" IP, while UK-focussed, individual academic(s)-focussed and IP-focussed perspectives were less, but equally common - each encompassed four (17%) of the perspectives given. Only three (13%) of these interviewees appeared to have an advance of knowledge-focussed perspective. Of course, the very fact that there was some duplication means some of these interviewees had more than one perspective on this subject.

These new insights are particularly interesting if we recollect that one of the problems identified by the Jarratt Report (CVCP, 1985) was that academic departments and individual academics tended to see their academic discipline as more important than the long-term well-being of the university which housed them. In the view propounded by the Jarratt Report, universities were "first and foremost corporate enterprises to which subsidiary units and individual academics are responsible and accountable"; failure to recognise this, it was emphasised, would weaken the institution and undermine its long-term vitality. It is pertinent to note that the most dominant category above is university-focussed, while least dominant is advance of knowledge-focussed. Moreover, if we examine the items listed under these categories, without exception they are "un-dimensional" - that is to say, whether we categorise them as shown in Figure 220 or as

shown immediately above, all the items in each category subscribe to the same viewpoint. So, for example, financial gain is perceived to be a good thing, as is counteracting foreign competition, whereas secrecy is perceived to be a bad thing *etc etc*

(ii) Treating Academic Inventions as Secret Know-How

Data relating to the interviewees' views were presented on a case-by-case basis in Figures 90, 136, 165 and 193. For ease of analysis the aggregate data from these four Figures are presented in Figure 221. It is immediately obvious that although most of these particular interviewees were positively disposed to the broad concept of "protecting" IP generated by academics, they were far less positively disposed to the idea of "protecting" inventions by treating them as secret know-how. Fifty per cent were against this idea altogether, though 33 per cent were prepared to accept the idea provided certain conditions were fulfilled. Only 17 unconditionally accepted the idea of "protecting" inventions generated by academics by treating them as secret know-how.

If we refer back to Figures 88, 134, 163 and 191, we find fairly marked differences of opinion between the four universities, as expressed by these particular interviewees. Those at Liverpool were the most positively disposed to treating inventions generated by academics as secret know-how - though it is worth noting that nonetheless half disagreed completely with this idea. Those at Hull and Strathclyde were the least positively disposed, two-thirds disagreed completely with this idea. Interviewees from York stood out from the others by virtue of the fact that none agreed without reservation and none disagreed entirely, all four felt that "protecting" academic inventions by treating them as secret know-how was acceptable provided certain conditions were fulfilled.

The case-by-case analyses sought to establish why some Deans and/or HoDs were antipathetic to/supportive of the idea of treating academic inventions as secret know-how, and what conditions others would seek to impose on secret know-how as a means of "protecting" inventions. Figures 91, 137 and 166 presented the data relating to interviewees' reasons for antipathy to/support for this idea. A comparison across these three cases reveals that one category (function of a university) features in all three, whereas two (practical difficulties and the end justifies the means) are case-specific. It is not necessary to aggregate the data to work out that, judging by replication and the number of "mentions", function of a university is the dominant category. Three-quarters of the reasons given fell into this category. Nor is it necessary to aggregate the categories posited in the case-by-case analyses in relation to the conditions which some interviewees would like to see imposed with regard to IP which it is proposed to treat as secret know-how. Of the ten who specified conditions, three (30%) wished to see the imposition of product/application-centred conditions, two (20%) required the imposition of academic-centred conditions, another two (20%) the imposition of time-centred conditions, a further two (20%) the imposition of cost/benefit-centred conditions and one (10%) the imposition of discipline-centred conditions.

Figures 92, 138, 167 and 194 presented data on the views of the Deans and/or HoDs in each university on the merits of patenting *versus* secret know-how as a means of "protecting" inventions generated by academics. For ease of analysis the aggregate data are presented in Figure 98. It is immediately clear that over two-thirds of this particular group of interviewees felt that patenting was the preferable "protection" mechanism, if there was a choice. Again, if we refer back to Figures 92, 138, 167 and 194, we find fairly marked differences of opinion between the four universities, as expressed by the particular Deans and/or HoDs interviewed. Fifty per cent of those at Liverpool felt that

patenting was not necessarily a preferable "protection" mechanism even if there was a choice, while only 17 per cent of those at Hull and Strathclyde took this view - and only 25 per cent of those at York

(iii) **Whether and How to Protect IP Generated By Academics The Right of Final Decision**

Figure 93 presented data from all four universities on the interviewees' awareness of university policy with regard to who has the right of final decision as to whether and how to "protect" IP generated by academics. We can see at a glance that only three (13%) of the interviewees were aware of their university's policy in this respect. Interviewees from York stand out from the rest in so far as half of them knew exactly how their university handled this question, moreover, the other half guessed correctly what their university's policy was. Nearly half the interviewees from Strathclyde also guessed correctly, but it is noticeable that only one interviewee from Liverpool guessed correctly.

Figure 94 presented data from all four universities on the interviewees' attitudes to their university's policy in this respect. We can see that 14 (58%) agreed with it, while 7 (29%) were ambivalent and 3 (13%) disagreed. Noticeably, all those who disagreed were from Liverpool, which contrasts most markedly with Hull, where all the interviewees agreed unreservedly with their university's policy. Interviewees from Strathclyde exhibited the highest incidence of ambivalence.

The case-by-case analyses sought to establish the reasons for the views expressed by these interviewees. The relevant data were presented in Figures 95, 139, 168 and 195. A comparison across all four cases shows us that two categories (academic freedom and pragmatism) feature in three of the four, while one (opportunity cost) features in two. The

remaining four categories (income generation, commercial judgement, IP ownership and onus to consult) are all case-specific. An examination of these four categories uncovered no more insightful or economical way of regrouping or recharacterising them - or, indeed, any of the other categories proposed. It was felt that these interviewees genuinely had quite diverse reasons for their views. Accordingly, the aggregate data from Figures 95, 139, 168 and 195 are presented in Figure 222 for ease of analysis.

Judging by replication and the number of "mentions", by far the most robust category is academic freedom, eight (36%) of the 22 reasons given fell into this category. The next most robust was pragmatism, four (18%) of the reasons given fell into this category. The other five categories were considerably less robust, judged on this basis. Academic freedom and pragmatism are interesting categories, in so far as one implies a *principled* rationale, whereas the other implies a purely *practical* rationale. If we refer back to Figures 95, 139, 168 and 195, we find that academic freedom was more of an issue in Hull and Liverpool than it was in York - and that it was not an issue at all in Strathclyde - at least, not for these particular interviewees. Nor was pragmatism an issue for these particular interviewees from Strathclyde. They were concerned exclusively with the possible loss to the *institution* which might be occasioned by the university's policy of allowing academics themselves to determine whether and how their IP should be "protected". Again, in the light of the recommendations of the Jarratt Report (CVCP, 1985), this is an interesting finding. The views of the interviewees from Strathclyde contrast strongly with those from Hull and York, who were not at all concerned with the impact on the *institution* of allowing academics themselves to determine whether and how their IP should be "protected".

The case-by-case analyses compared interviewees' opinions on who should make the final decision about whether and how to "protect" IP with their opinions on who should own IP generated by academics and whether inventions should be "protected" by being treated as secret know-how. In every case, a certain lack of logic was identified. As chapter 7 emphasised, IP law is based on the premise that whoever owns the rights to a piece of IP has the exclusive right to determine whether and how that IP is "protected" and exploited. The views expressed by most of the interviewees were clearly quite at odds with this premise. It is difficult to know how to interpret this. It could simply be indicative of the level of ignorance of IP law among these interviewees. It might simply be indicative of muddled thinking. On the other hand, it may be that some of these interviewees tacitly expected the university to wield its rights in a benign fashion, deferring to the wishes of the academic(s) concerned, at the same time, however, many evidently expected the university to ensure that IP was not "protected" by being treated as secret know-how - to be directive, in other words. As for interviewees who thought that ownership of IP should be vested in the academic(s) who generated it, it is not clear how they imagined the academic(s) in question could be prevented from opting for "protection" in the form of secret know-how if they were so minded. Perhaps they expected their fellow academics to be as principled as they themselves often claimed to be, to wield their rights in a benign fashion. These are interesting issues which could clearly benefit from further research.

(iv) The Logistics of Patenting

Figure 96 presented data from all four universities on the attitudes of 20 interviewees to temporarily reducing an inventor's workload to assist him/her to draft/write a patent specification. We can see that only five (25%) would be prepared as a matter of principle to temporarily adjust a member of staff's workload for this purpose, though a further six (30%) said that they would be prepared to consider this and make an *ad hoc* decision.

based on the merits of the individual proposition (Interestingly, Strathclyde had the highest proportion of interviewees prepared to make an *ad hoc* decision, based on the merits of the individual proposition, while Liverpool had the lowest proportion) Eight (40%) out of 20 interviewees indicated that they were not prepared to entertain the idea of temporarily adjusting a member of staff's workload, no matter how meritorious the proposition Figure 96 also shows us that York stands out from the other three in so far as one HoD proposed an alternative tactic to adjusting a member of staff's workload - namely getting the department to fund the cost of a patent agent, if the university would not

The case-by-case analyses sought to establish why these particular interviewees held these views The relevant data were presented in Figures 97, 140, 169 and 196 A comparison across all four cases reveals that two categories (departmental flexibility and nature of the task) feature in three of the four, while another two (cost/benefit and characteristics of the patent) feature in two (different) cases apiece Only one category (practical considerations) is case-specific On reflection, there seems to be no reason why the reason encompassed by this last category should not be combined with departmental flexibility Accordingly, the aggregate data are presented in Figure 223, incorporating this revision, for ease of analysis Judging by replication and the number of "mentions" departmental flexibility is the most robust category, six (35%) of the reasons given fell into this category Nature of the task is the next most robust, five (29%) of the reasons given fell into this category Cost/benefit and characteristics of the patent each encompass three (18%) of the reasons given

What insights do these four categories give us? It would seem that these particular interviewees have three contrasting views concerning patents In one view patents are seen

as "just another university activity", as an integral part of the dissemination of research. The amount of help an inventor gets when it comes to drafting/writing the patent specification will depend on the overall flexibility of his/her department - and this, in turn, will be largely determined by historic factors. In the opposing (and apparently less prevalent) view, patents are seen as something different, an activity which may require special assistance - or an activity which should positively not be assisted, since there is no reason why "busy people" should put themselves out to help a fellow member of staff line his/her pockets. The third viewpoint seems to occupy the middle ground, patents are seen as a normal university activity, but it is recognised that patent law imposes certain constraints, with the result that special assistance may be required in individual instances.

10.7.6 Entrepreneurially Exploiting IP Generated by Academics

(i) Entrepreneurially Exploiting "Hard" IP

The case-by-case analyses sought to establish the interviewees' views on the entrepreneurial exploitation of "hard" IP. As each case analysis made clear, this proved to be one of the more difficult sections of Questionnaire C to administer and it was correspondingly difficult to analyse. In retrospect it is clear that an initial question should have established their views on the general concept, in the same way that the initial question on "protecting" IP established the degree of support for the broad concept, before focussing on specific methods of "protecting" IP. Instead, the pilot questionnaire focussed immediately on two specific entrepreneurial scenarios - a university company and a joint venture between the university, members of the academic staff plus, perhaps, a third party. The revised questionnaire focussed on a third entrepreneurial scenario as well - independent academic spin-off companies. However, it, too, omitted to establish interviewees' views on the broad concept. It is now recognised that this was an important omission.

Mindful of the caveats expressed in relation the contents of Figure 99, it would appear that at least 52 per cent of the 25 interviewees were in favour of the idea of exploiting IP via university companies, while at least 64 per cent were in favour of the idea of joint ventures with members of the academic staff. However, at least 28 per cent were not in favour of academic spin-off companies and, taking account of the amount of missing data, possibly as few as 36 per cent were in favour.

Given the quantity of missing data in relation to these interviewees' views on university companies, there are few insights to be gained from comparing the attitudes of Deans and/or HoDs from the four institutions. Where joint ventures are concerned, this is less problematical. As a group the interviewees from Liverpool exhibited the greatest support for this particular entrepreneurial scenario, while those from York (and possibly Hull) seem to have exhibited the least support for it. Interviewees from Strathclyde were closer to those from York than those from Liverpool where their views on joint ventures were concerned. This is an interesting finding, given that of the four universities York and Strathclyde are the two which have gone in for joint ventures - and very successful joint ventures in York's case, whereas Hull has done so only recently and Liverpool's brief foray into participating in joint ventures was not deemed by the university to have been a very successful *modus operandi*. If we exclude Hull from the picture in view of the quantity of missing data in relation to independent academic spin-off companies as a vehicle for exploiting "hard" IP, we find the interviewees from Strathclyde unanimously against the idea, while the interviewees from York were almost all in favour of it. The interviewees from Liverpool seemed to occupy the middle ground. It would be interesting to establish the extent to which this diversity is a reflection of the idiosyncratic views of individual informants, how much it is coloured by the factors associated with the informant's own discipline, how much it reflects the ethos of the institution, how much it

is the result of critical incidents *etc etc*. Since the HoD plays such a key role, it could be fruitful to investigate these particular questions by surveying a stratified sample.

(ii) Entrepreneurially Exploiting "Soft" IP

The case-by-case analyses sought to establish the interviewees' views on three mechanisms by which academics could exploit "soft" IP personal consultancy, commercial arms of departments and spin-off companies. Since the case-by-case analyses established that the data relating to spin-off companies was of questionable value, the cross-case analysis will focus on the first two mechanisms, omitting the third.

Personal Consultancy

The views of interviewees from all four universities were presented in Figure 101. We can see at a glance that with the possible exception of two interviewees from Strathclyde, none of the interviewees felt that extensive consultancy was an "inert" activity, in the sense that the word is employed in the physical sciences. All of them thought it would have some kind of impact - *ie* a positive or a negative impact. In fact, it is evident from Figure 101 that many thought that extensive consultancy would have both a positive and a negative impact, rather than one or the other. There are marked differences between the four institutions, however. For instance, 80 per cent of informants from Strathclyde felt extensive consultancy would have a positive impact, while only 40 per cent felt it would have a negative impact. Only 50 per cent of the interviewees from Liverpool felt that extensive consultancy would have a positive impact, while 88 per cent felt it would have a negative impact. The interviewees from York were the most "balanced" in this respect - in the sense that three-quarters felt it would have a positive impact and three-quarters felt it would have a negative impact.

The case-by-case analyses sought to establish the types of impact which the interviewees' felt that extensive consultancy would have. The data were presented in Figures 102, 142, 171 and 198. A comparison across all four cases reveals that two categories (research and students) feature in all four, while a further three categories (access, motivation and administrative load) feature in two cases apiece. The remaining three categories (bridging the divide, third party benefit and staff recruitment) feature in just one case apiece. An examination of these three categories uncovered no more economical or insightful way of regrouping or recharacterising them - or, indeed, any of the other categories proposed - without considerable reductionism. It was felt that some interviewees genuinely envisaged impacts which were not articulated by their counterparts in other institutions. Accordingly, the aggregate data from Figures 102, 142, 171 and 198 are presented in Figure 225 for ease of analysis.

Judging by replication and the number of "mentions", research is by far the most robust category, 24 (44%) of the 54 types of impact cited fell into this category. The next most robust is students, which encompasses 12 (22%) of the types of impact cited. Access, motivation and administrative load are considerably less robust, encompassing 6 (11%), 3 (6%) and 3 (6%) respectively of the types of impact cited. If we refer back to Figures 102, 142, 171 and 198, we find that although research was the most dominant concern in Strathclyde, Liverpool and York, it was slightly more of a concern in Strathclyde than it was in Liverpool or York, though the difference is not significant. It is noticeable, though, that types of impact encompassed by the category students were the most dominant concern at Hull, while these were a relatively minor concern for the interviewees from Strathclyde and York.

The "dimensionality" of these eight categories is interesting. Five of them are "uni-dimensional" - that is to say, extensive consultancy is deemed to be "a good thing" in terms of access, third party benefit, bridging the divide and staff recruitment, and to have a uniformly negative impact on people's administrative load. The other three are "multi-dimensional", however - that is to say, extensive consultancy was seen by these particular interviewees as a mixed blessing in terms of research, students and staff motivation. What Figures 102, 142, 171 and 198 do not reveal - because types of impact repeatedly cited are not comprehensively listed in the *text* in these Figures - is whether or not there are marked differences between the four institutions, especially where research and students are concerned. In fact, the differences are not particularly marked. The most we can say is that interviewees at Strathclyde seemed to cite more positive impacts of extensive consultancy on research than those at Liverpool, and *vice versa* - but the difference is not sufficient to explain the sharply divergent views the interviewees from the two universities expressed with regard to the nature of impact of extensive consultancy - *ie* positive *versus* negative. We must conclude, then, that the examples they gave do not correlate as well as they might with the views they expressed.

These eight categories are also interesting in that they lend themselves to being "super-categorised" in ways which give additional insights into the thinking of these particular interviewees. For instance, we could group them in the following way:

- * individual academic-focussed (motivation),
- * department-focussed (research, students, administrative load, access, staff recruitment),
- * externally-focussed (third party benefit, bridging the divide)

Judged by the number of categories and the number of "mentions" notched up by each category, these interviewees were overwhelmingly department-focussed, 46 (85%) of the

54 types of impact cited fell into this "super-category" To return to the Jarratt Report, in one sense this could be construed as extremely encouraging, these particular interviewees' thinking was clearly focussed on the impact of extensive consultancy on the institution. However, it could be argued that universities have become too inward looking, too self-interested, to the extent that this conflicts with the objectives of other government policies, significantly, only 5 (9%) of the types of impact cited fell into the externally-focussed category - and both of these were case-specific, two interviewees at Hull saw extensive consultancy as helping bridge the university/industry divide, while three at Strathclyde saw it as conferring third party benefit As a group, these 23 interviewees do not seem to have been particularly concerned about the technological contribution made by their university to the community in which it was located, to the UK as a whole - or, if they were, then this came second to internal concerns occasioned by the perceived impact of extensive consultancy These interviewees from Hull and Strathclyde appear to be the exception, rather than the rule where this is concerned

The case-by-case analyses sought to establish the interviewees' attitudes to the imposition of a time limit with regard to the amount of personal consultancy done by academics The data were presented in Figures 103, 143, 172 and 199. For ease of comparison, the aggregate data are presented in Figure 226 We can see at a glance that, as a group, the interviewees from these four universities were fairly equally divided between being in favour of a time limit and being against it, while a relatively small proportion suggested that *guidelines* would be useful, rather than an absolute limit There are quite clearly marked differences between the universities, however If, in view of the amount of missing data, we exclude Hull from the picture, we find that 86 per cent of the interviewees from Strathclyde were in favour of a time limit, whereas only 13 per cent of those from Liverpool were in favour Conversely, 63 per cent of those from Liverpool

were against a time limit, whereas only 14 per cent of those from Strathclyde were of this opinion. Interviewees from York were predominantly against having a time limit. These findings are hard to interpret. At the time the interviews were conducted, Strathclyde had in place the most restrictive time limit, while Liverpool had a considerably more generous time limit in place and York had none. As we can see from the case study narratives (Appendix F), with one or two exceptions it does not look as though these interviewees' attitudes correlate with the amount of consultancy actually done by members of their staff. It is clear that the interviewee's discipline coloured their attitude in a few instances. In most instances, though, these *appear* to be idiosyncratic, personal attitudes, rather than, say, attitudes coloured by institutional ethos or the amount of consultancy undertaken or individual disciplines. Again, this is an area which could benefit from further research. It could be that research assessment exercise ratings influence these HoDs' views, or critical incidents *etc etc*

Departmental Commercial Arms

The case-by-case analyses sought to ascertain whether the departments from which the HoDs were drawn had established departmental commercial arms. As Figures 104, 144, 173 and 200 revealed, details of 13 departmental commercial arms were provided by eight (38%) of the 21 HoDs interviewed - that is to say, these eight departments averaged 1.6 commercial arms each. We can see from these Figures that most were founded in the 1980s, rather than the 1970s or earlier, and that eight (61%) were the result of a "top-down" as opposed to a "bottom-up" initiative. Only four (31%) were notional, in the sense that they did not have their own, dedicated staff, but only two (15%) - both at York - had their own, dedicated accommodation, the rest had to vie for space in the host department unless they were purely notional entities. Only four (31%) were deemed to be entirely self-funding; seven (54%) received indirect financial support from the department, while

two (15%) were in receipt of direct financial support - albeit on a temporary basis while they established themselves. In nine (69%) of the thirteen instances the department was the financial beneficiary of the activities of its commercial arm(s). In three (23%) instances, the academics who were involved were the financial beneficiaries - and in a fourth, the academics were the financial beneficiaries together with the department. In one (8%) instance, dating from the 1970s, the departmental commercial arm itself was the beneficiary, all the income was ploughed back into expanding its expertise and activities.

The case-by-case analyses sought to establish the benefits, other than financial benefits, which these particular HoDs felt were conferred by their departmental commercial arm(s). The relevant data were presented in Figures 105, 145, 174 and 201. A comparison across all four cases reveals that only one of the twelve categories (enhancement of reputation) is replicated at all. How should we interpret this finding? Do the HoDs in these universities perceive their departmental commercial arms as conferring genuinely different benefits or is it possible that the groupings and characterisations (*ie.* the categories) proposed are not the most appropriate or useful? Examination of all the benefits cited suggested that there was a more economic and hopefully more insightful way of grouping the benefits cited. These (predominantly) new categories are presented on an aggregate basis in Figure 228. These particular HoDs felt that their departmental commercial arm(s) conferred.

- * enhancement of reputation;
- * a departmental/university resource,
- * other departmental benefits;
- and/or * third party benefit

The first of these features in three cases; the second and third feature in all four cases, but the fourth features in only one case. Judging by replication and the number of "mentions", the first three are more or less equally robust, each encompassing seven (30%) of the

benefits cited. The fourth relates exclusively to Hull, encompassing half the benefits cited by HoDs from Hull. We do not need to formally "super-categorise" these to demonstrate once again that, with the exception of third party benefit, these are all inward-looking, self-interested benefits.

We can deduce from the case-by-case analyses that six (46%) of the 13 departmental commercial arms had caused controversy when they were founded; these particular commercial arms were at Liverpool, Strathclyde and York, but not at Hull. The case-by-case analyses sought to establish the grounds for controversy. The relevant data were presented in Figures 146, 175 and 202. A comparison across all three cases reveals that the seven grounds for controversy cited were deemed to be categories in their own right, as a result, none of the resulting categories is replicated at all. Examination of the grounds for controversy cited suggested that there was a more economic and hopefully more insightful way of grouping them. These (partially) new categories are presented on an aggregate basis in Figure 229. These particular HoDs felt that their departmental commercial arm(s) had caused controversy on grounds of.

- * opportunity cost,
- * resentment;
- * legitimacy;
- and/or * fear of the tail wagging the dog

The first two categories feature in two cases, while the last two are case-specific - though one could imagine them surfacing elsewhere since they are not especially situation-specific. Where these particular commercial arms are concerned, then, judged by replication and the number of "mentions" opportunity cost seems to be the most robust category, closely followed by resentment. It is evident that a few of the problems cited were *anticipated* rather than *actual* and that some were in the nature of "teething

troubles", as opposed to more fundamental problems. However, it is also evident that some problems increased with time and were felt to be so intractable that ultimately the commercial arm was spun off as a separate company.

We can deduce from the case-by-case analyses that 13 (62%) of the 21 HoDs came from departments in which there was no commercial arm. The case-by-case analyses sought to establish why this was. The relevant data were presented in Figures 106, 147 and 203. A comparison across all three cases reveals that only one of the nine categories (inutility) features in more than one case. Examination of the reasons given suggested that there was a more economic and hopefully more insightful way of grouping them. These new categories are presented on an aggregate basis in Figure 230. These particular HoDs felt that their department had no commercial arm on grounds of:

- * pointlessness;
- * deterrent aspects;
- and/or * concern about their remit

The first of these new categories features in three of the four cases, while the second features in just two, the last features in only one case. Judged by replication and the number of "mentions", the first two are robust categories, respectively encompassing six (43%) and seven (50%) of the 14 reasons given.

10.7.7 Support for Entrepreneurial Academics

The case-by-case analyses sought to establish the interviewees' views on four mechanisms by for giving would-be academic entrepreneurs time to devote to business start-up: (i) a formal reduction in or rescheduling of the academic's normal workload for a limited period, (ii) a part-time contract for a limited period, (iii) complete leave of absence for a limited period and (iv) an extension to a previously agreed period of absence, where it has

taken longer than anticipated to take a spin-off company to the point that the academic can reduce his/her input - and being forced to return prematurely could be critical to the success of the company. Since the case-by-case analyses established that the data relating to (iv) was largely missing, the cross-case analysis will focus on the first three mechanisms, omitting the fourth.

(i) **A Formal Reduction in/Rescheduling of the Normal Workload for a Limited Period**

The case-by-case analyses sought to establish the interviewees' attitude *in principle* to this form of support for would-be academic entrepreneurs, and the views of those who indicated support in-principle on translating that support into practice. The relevant data were presented in Figures 107a, 148a, 176a and 204a. For ease of comparison, the aggregate data are presented in Figure 227a. We can see at a glance that there is, in fact, no difference between principle and practice, as reported by the interviewees in Hull, Liverpool and York. (The interviewees from Strathclyde were not asked the relevant questions since it was not the university's policy to create time for would-be academic entrepreneurs in this manner, in retrospect, it is recognised that it would have been interesting nonetheless to have elicited these data.) Nearly half of the interviewees who were asked the relevant questions indicated that they could not give an in-principle answer, that they would make an *ad hoc* decision, and that in practice, their support would be conditional upon certain criteria being fulfilled. Over one third indicated that they would be supportive neither in principle nor in practice. We can see from Figures 107a, 148a, 176a and 204a that there are marked differences between the three institutions, however. Interviewees from Hull exhibited the greatest willingness to be supportive in this manner, those from Liverpool exhibited the least willingness, while those from York occupied the middle ground.

(ii) **A Part-Time Contract for a Limited Period**

The case-by-case analyses sought to establish the interviewees' attitude *in principle* to this form of support for would-be academic entrepreneurs, and the views of those who indicated support in-principle on translating that support into practice. The relevant data were presented in Figures 107b, 148b, 176b and 204b. For ease of comparison, the aggregate data are presented in Figure 227b. We can see at a glance that, in principle at least, this was viewed more positively. Thirteen (65%) of the interviewees who were asked the relevant questions indicated that they would be supportive in principle, a further six (30%) said that they could not give an in-principle answer, that they would make an *ad hoc* decision, only one (5%) was against this form of support for would-be academic entrepreneurs as a matter of principle. Figure 227b exhibits a general "rightward drift" when it comes to putting principles into practice, however. Only four (20%) felt that they would actually be supportive in practice - *ie* only a third of those who said that in principle they would support a request from a would-be academic entrepreneur for a part-time contract for a limited period. Twelve (60%) felt that their support would be conditional upon certain criteria being fulfilled, while four (20%) indicated that in practice they would not support a request from a would-be academic entrepreneur for a part-time contract for a limited period - *ie* four times as many as said they would be unsupportive in principle.

We can see from Figures 107b, 148b, 176b and 204b that, once again, there are marked differences between the universities. Where in-principle support is concerned, interviewees from Hull exhibited the greatest willingness to be supportive in this manner, while those from Strathclyde were nearly as willing - and it is possible that, had data been elicited from all seven instead of just five, they would have exhibited the greatest willingness. Interviewees from Liverpool and York were equally but considerably less supportive in

principle, while those from York exhibited the greatest tendency to make an *ad hoc* decision, rather than an in-principled decision. Where putting principles into practice is concerned, many interviewees from Hull, Liverpool and Strathclyde seemed to feel unable to put in-principle support into practice, while those from York anticipated no problems in this respect. (One wonders if this results from the fact that York has had to do less belt-tightening than many other universities during the 1980s, as a result of the 1981 cuts, which makes it more able to respond flexibly in situations such as this) Nonetheless, once again interviewees from Hull exhibited the greatest willingness to support a request from a would-be academic entrepreneur for a part-time contract for a limited period, while those from Liverpool exhibited the least willingness

(iii) Complete Leave of Absence for a Limited Period

The case-by-case analyses sought to establish the interviewees' attitude *in principle* to this form of support for would-be academic entrepreneurs, and their views on putting it into practice The relevant data were presented in Figures 107c, 148c and 204c (The interviewees from Strathclyde were not asked the relevant questions since it was not the university's policy to create time for would-be academic entrepreneurs in this manner, in retrospect, it is recognised that it would have been interesting nonetheless to have elicited these data) For ease of comparison, the aggregate data are presented in Figure 227c Once again We can see at a glance that, in principle at least, complete leave of absence for a limited period was viewed almost as positively as a part-time contract as a mechanism for giving would-be academic entrepreneurs time to devote to business start-up Nine (60%) of those who were asked were supportive in principle, a further five (33%) indicated that they would make an *ad hoc* decision, only one (7%) was against this form of support for would-be academic entrepreneurs as a matter of principle Again, though, Figure 227c exhibits "rightward drift" when it comes to putting principles into

practice Only four (27%) thought that in practice they would support an application for complete leave of absence for a limited period - less than half those who were supportive in principle Seven (47%) felt their support would be conditional upon certain criteria being fulfilled, while four (27%) indicated that they would not support a request from a would-be academic entrepreneur for complete leave of absence - *ie* four times as many as indicated an in-principle refusal to be supportive in this way.

We can see from Figures 107c, 148c , 176c and 204c that there are marked differences between the three universities Where in-principle support is concerned, once again interviewees from Hull exhibited the greatest willingness to be supportive in this manner, while those from Liverpool exhibited the least willingness Once again those from York exhibited the greatest tendency to make an *ad hoc* decision, rather than an in-principled decision Where putting principles into practice is concerned, yet again we find that many interviewees from Hull and Liverpool seemed to feel unable to put in-principle support into practice, while those from York anticipated no problems in this respect Interviewees from York exhibited the greatest willingness to support a request from a would-be academic entrepreneur for complete leave of absence for a limited period, while once again those from Liverpool exhibited the least willingness

No attempt was made in the case-by-case analyses to categorise the reasons given by HoDs for rejecting outright any of these mechanisms for giving would-be academic entrepreneurs time, nor was any attempt made to categorise the criteria which some HoDs required to be fulfilled before they would lend their support to any of these mechanisms It was felt that the reasons and conditions outlined were too diverse to make it worthwhile attempting to categorise them A comparison across all four cases suggests that there are common themes, however Accordingly, efforts were made to group and characterise

these reasons and conditions. As Figure 234 shows, where reasons for rejecting these mechanisms were concerned, this yielded the following five categories. These particular interviewees indicated they would not support certain mechanisms to give would-be academic entrepreneurs time to devote to business start-up on grounds of

- * inability to get teaching cover,
- * logistics;
- * entrepreneurship being a non-mainstream activity;
- * the viability of the department,
- and/or *
- * personal gain.

Since none of the HoDs from Strathclyde or York rejected any of these mechanisms out of hand, by definition none of these categories can feature in more than two cases. In fact, the first two feature in both cases, while the last three feature only in one case, namely Liverpool. It is immediately obvious that judged by replication and the number of "mentions", only two of these categories are remotely robust - viz inability to get teaching cover and logistics.

Figure 235 shows that where conditional support was concerned, efforts to group and characterise the conditions outlined yielded the following six categories

- * getting teaching cover,
- * time constraints being observed,
- * nature of business idea,
- * departmental support,
- * a *quid pro quo*,
- and/or *
- * overcoming recruitment difficulties

Two of these categories (getting teaching cover and nature of business idea) feature in three cases, while three (time constraints, departmental support, *quid pro quo*) feature in

two cases apiece. The remaining category (overcoming recruitment difficulties) features in just one case. Judged by replication and the number of "mentions", getting teaching cover, time constraints and nature of the business idea are all equally robust conditions; each encompasses seven (21%) of the 33 conditions outlined. Departmental support is also fairly robust, encompassing six (18%) of the conditions outlined. The others are relatively weak categories, judged on this basis.

The four universities exhibit differences where the distribution of these categories is concerned. Interviewees at Hull, Liverpool and Strathclyde were preoccupied with getting teaching cover whereas this was not an issue for those at York; however, overcoming recruitment difficulties was a concern only for interviewees from York. Those at Hull, Liverpool and York were concerned about the nature of the business idea, while this was not an issue for those at Strathclyde. Interviewees at Hull and Strathclyde were preoccupied with time constraints, while those at Liverpool and York were interested in getting a *quid pro quo*. Departmental support was an issue for interviewees at York and Strathclyde but not, apparently, for those at Hull or Liverpool.

There is an interesting difference between the reasons for rejecting these mechanisms categorised as inability to get teaching cover and conditions for support categorised as getting teaching cover. These should probably be combined into one, multi-dimensional category, viz teaching cover. Attention has already been drawn (in the case analysis for Liverpool, section 10.5.6) to the possibility that some HoDs exhibit passive acceptance confronted by this kind of obstacle, that they seem to lack any sense of vision where academic entrepreneurship is concerned. It has already been observed that the IL office could help overcome such "obstacles", if its staff had sufficient vision and interest.

10.7.8 Incentives and Disincentives

The case-by-case analyses sought to establish the interviewees' awareness of various incentives and disincentives operating in their university in relation to the exploitation of IP, and their attitude to the incentives and disincentives in question. Like the case-by-case analyses, the cross-case analysis will focus first on incentives and disincentives in relation to the exploitation of "soft" IP and then on the exploitation of "hard" IP by the more traditional mechanisms - viz. personal consultancy, and patents and licenses/assignments. It will conclude by focussing on incentives and disincentives in relation to the entrepreneurial exploitation of "soft" or "hard" IP.

Personal Consultancy

The data relating to the income earned by academics from personal consultancy were presented for all four cases in Figures 108 to 109. It is unfortunate that, as a result of piloting the original version of Questionnaire C at Hull, large amounts of data are missing. If we exclude Hull from the analysis, we can see from Figure 108 that just over half the interviewees were aware of their university's policy *vis-a-vis* earnings limits, while a slightly higher percentage were aware of its policy *vis-a-vis* taking a cut of the income earned by academics from personal consultancy. It is also evident that interviewees from Liverpool were markedly less aware than their counterparts in Strathclyde and York.

Similarly, if we exclude Hull from the analysis, we can see from Figure 109 that 74 per cent of the interviewees agreed with their university's policy *vis-a-vis* earnings limits, while 11 per cent were ambivalent and a further 11 per cent disagreed. Attitudes to their university's policy on taking a cut of the income earned by academics from personal consultancy were markedly different, however. Just 37 per cent agreed with it, while 47

per cent were ambivalent and 16 per cent disagreed with it

Figure 109 also shows us that interviewees from York stand out as being in almost unanimous agreement with their university's policy *vis-a-vis* earnings limits and taking a cut of the income earned from personal consultancy. That is to say, these interviewees supported a policy which, it could be argued, incorporated incentives to do personal consultancy - or certainly did not incorporate disincentives. Despite the fact that Strathclyde's approach to earnings limits and taking a cut of the income from personal consultancy was almost identical to York's ⁽⁶⁾, it is evident that fewer of the interviewees from Strathclyde agreed with their university's policy. Most supported its policy *vis-a-vis* earnings limits, but 43 per cent were ambivalent about the fact that Strathclyde did not take a percentage cut of the income from personal consultancy. Only 29 per cent agreed with this, while another 29 per cent disagreed entirely. In other words, nearly one third of these particular interviewees disagreed with a policy which, it could be argued, incorporated incentives to do personal consultancy - or certainly did not incorporate disincentives. As we have seen, Liverpool's policy was different to York's and Strathclyde's. Although Liverpool imposed no earnings limits, the university expected to take a 25 per cent cut of the income from personal consultancy, a policy which, it could be argued, represented a potential disincentive to doing personal consultancy. Interestingly, we can see from Figure 109 that only 50 per cent of the interviewees agreed completely with the absence of an earnings limit, 25 per cent were ambivalent and 13 per cent disagreed entirely. Moreover, if we read the small print at the bottom of Figure 109 we find that 75 per cent of the interviewees from Liverpool agreed in principle with the university taking a cut of the earnings from personal consultancy, all but one of those who were ambivalent were concerned not about the principle but about the actual percentage levied, which was felt to be too high. Only 13 per cent disagreed entirely with both the

principle and its manner of implementation To sum up, at least one interviewee out of the eight from Liverpool would have liked there to be an earnings limit, and six out of the eight felt it was appropriate for the university to take a cut of the earnings from personal consultancy In other words, most of the interviewees from Liverpool were in favour of a policy which, it could be argued, represented a potential disincentive to doing personal consultancy

The case-by-case analyses sought to establish why these particular interviewees in each institution held the views they expressed The relevant data were presented in Figures 110, 149, 177 and 205. A comparison across all four cases shows us that one category (motivation) features in three, while another two (quid pro quo and transparency) feature in two cases. The remaining nine categories (part of remit, career development, excess, no discrimination, indicator, preference for in-house consultancy, consistency, options to benefit university and illogicality) feature in just one case apiece Once again this provokes the question how should we interpret this finding? Do the Deans and/or HoDs in these universities have genuinely different reasons for their views on their university's policy *vis-a-vis* earnings from personal consultancy, or is it possible that the groupings and characterisations (*ie* the categories) proposed are not the most appropriate or useful? Examination of all the reasons given suggested a slightly more insightful way of grouping or characterising them, as Figure 237 shows These particular interviewees were felt to explain their views on their university's policy in this respect in terms of seven different categories, *viz*

- * motivation;
 - * transparency;
 - * malconception;
 - * the extent to which there was a *quid pro quo*,
 - * the appropriateness of the activity;
 - * benefit to the university;
- or
- * its value as an indicator to staff.

Judging by replication and the number of "mentions", *quid pro quo* is the most robust category, five (24%) of the 21 reasons given fell into this category. The next most robust is motivation, four (19%) of the reasons given fell into this category. The next most robust are apparently transparency, malconception and benefit to the university; each of these categories encompassed three (14%) of the reasons given. The other categories appear to be relatively weak. All of these categories are interesting, though, in that, with the exception of *quid pro quo*, they are remarkably "uni-dimensional", they encompass only one viewpoint.

If we refer back to Figures 110, 149, 177 and 205, we see that where some categories are concerned, there were marked differences between the four universities. Interviewees at Hull and Liverpool were preoccupied with the extent to which their university provided a *quid pro quo*, while those at Strathclyde were more concerned that the university should benefit from such activities. Interviewees at Hull seemed to see personal consultancy as an appropriate activity for their staff to be undertaking, while at least one interviewee from Liverpool felt that such activities should be strictly limited.

The data relating to the impact of personal consultancy on promotion were presented for all four cases in Figures 111 and 112. We can see from Figure 111 that 80 per cent of

the interviewees were aware of their university's policy - or lack of policy - in this respect. Those at York exhibited the greatest awareness, those at Hull the least. We can also see that at least 32 per cent felt that in practice personal consultancy was not likely to number among the factors taken into account by the promotions committee, while at least 24 per cent were uncertain what to believe. Given the quantity of missing data, it would be inappropriate to comment on the beliefs of interviewees from individual universities.

Figure 112 shows us that at least 76 per cent of the interviewees felt that personal consultancy should be taken into account when considering applications for promotion. Given the amount of missing data, it is inappropriate to draw too many conclusions about the attitude of interviewees from individual universities; suffice it to say that all the interviewees from Hull felt personal consultancy should be taken into account, whereas only 75 per cent of those from York did.

The case-by-case analyses sought to establish why these particular interviewees in each institution held the views they expressed. The relevant data were presented in Figures 113, 150, 178 and 206. A comparison across all four cases shows us that one category (holistic approach) features in three cases, while two (difficult to evaluate and appropriate to discipline) feature in two cases apiece. The remaining nine categories (bridge to industry, income generation, creativity, alternative reward, impact of research selectivity, appropriate activity, inappropriate activity, appropriate to university and gauge of external value) feature in just one case apiece. It is immediately obvious from this list of categories that many could benefit from regrouping and slight recharacterisation. Figure 231 displays the results of this exercise and shows us that these particular interviewees explained their views on their university's policy in respect of the impact of personal consultancy on promotion on grounds of

- * the appropriateness of this activity;
 - * evaluation of this activity;
 - * the need for a holistic approach;
 - * the importance of links with industry;
- or
- * financial considerations

Judging by replication and the number of "mentions", the appropriateness of the activity is by far the most robust category, encompassing nine (45%) of the 20 reasons given.

Evaluation is apparently the next most - though somewhat less - robust, encompassing four (20%) of the reasons given. Holistic approach is a little less robust, encompassing three (15%) of the reasons given. The other two categories must be seen as relatively weak.

It is noticeable that two of these categories, appropriateness and evaluation exhibit a wide range of "dimensions". Appropriateness, for instance, is judged from the perspective of the university, the department, the discipline, the variable nature of the activity itself, and from the perspective of conflicting policies - viz a perceived tension between the government's wish, expressed in the 1985 Green Paper, that consultancy should count as a criterion for promotion, and its simultaneous wish, expressed via the introduction of the research selectivity exercises, that departments and institutions should be rewarded for quality - quality primarily measured in terms of refereed publications. Appropriateness and evaluation are interesting categories to juxtapose; one seems to focus*¹⁶⁸² on pragmatism, the other on pragmatism. Similarly, appropriateness and holistic approach are interesting categories to juxtapose, they convey quite different views of what should be expected of academics at the end of the 1980s. In one view, all academics should be well-rounded *individuals* - and the undertaking of consultancy is one sign of well-roundedness; in the other, the appropriateness of consultancy is determined, as we have seen, from one of a wide range of perspectives - none of which are focussed on the *individual*.

Appropriateness and importance of links with industry are also interesting categories to juxtapose. All the perspectives encompassed by appropriateness are *internally*-focussed, even the impact of the research selectivity exercises could be seen as an internal focus, since the outcome of the research selectivity exercises will affect public research funding which accrues to that department/institution. The reasons categorised as importance of links with industry are the only *externally*-focussed ones given by these interviewees (both of whom were from Hull) - that is to say, the only ones to consider the value of personal consultancy to external constituencies. What is striking is that the three most robust categories encompass reasons given by interviewees from three, and in one case all four institutions. If key figures like these Deans and/or HoDs have such differing views on the value and purpose of an activity like personal consultancy, how, we may ask, can more junior members of the academic staff be expected to deduce how it would be regarded by the university's promotions committee?

Patents, Licenses/Assignments Etc

The data relating to the distribution of income from the exploitation of IP were presented for all four cases in Figures 114 and 115. We can see at once from Figure 114 that 60 per cent of the interviewees were only semi-aware of their university's policy - that is to say, they were aware of the principle of income distribution, but unaware of the specifics of the percentage split/sliding scales *etc*. Only 16 per cent could quote the specific percentage split/sliding scales. Figure 114 also shows us that there were marked differences between the four universities. None of the interviewees from Hull could quote the specific percentages/sliding scales - which is probably unsurprising, given that Hull employed four different formulae with a variety of income bands. At least 83 per cent of the interviewees from Hull were aware of the principle of income distribution, however. This contrasts sharply with the interviewees from Liverpool - of whom 63 per cent were

unaware of the principle, let alone the specifics of the percentage split Interviewees from York exhibited the greatest level of awareness; 75 per cent were aware of the principle and 25 per cent could quote the sliding scales exactly.

Figure 115 reveals that at least 64 per cent of the 25 interviewees were ambivalent or uncertain about the effectiveness of sharing the income from the exploitation of IP as an incentive. Those from Liverpool exhibited the greatest incidence of ambivalence/uncertainty, while those from York exhibited the lowest incidence We can also see that at least 20 per cent of the 25 interviewees felt that sharing the income from the exploitation of IP was definitely an ineffective incentive. This view was particularly prevalent at Strathclyde and York. On the other hand, the view that income sharing was an effective incentive was most prevalent at York, too.

The case-by-case analyses sought to establish why these particular interviewees held the views they expressed. The relevant data were presented in Figures 116, 151, 179 and 207. A comparison across all four cases shows us that one category (hypothetical reward) features in all four, while three categories (just reward, dependent on orientation and conflict with other policies) each feature in two cases. The remaining five categories (comparative disincentive, extra effort, concern about beneficiaries, illogicality and self-defeating) feature in just one case apiece. This provokes the usual question. do the Deans and/or HoDs in these universities have genuinely different reasons for their views on the effectiveness of distributing income from the exploitation as an incentive to individual academics and departments, or is it possible that the groupings and characterisations (*ie.* the categories) proposed are not the most appropriate or useful? Examination of all the reasons given suggested a slightly more economical way of grouping or characterising them, but not a more insightful way, as Figure 232 shows. These particular interviewees

explained their views on the effectiveness of income distribution as an incentive on grounds of it being:

- * a hypothetical reward,
- * a just reward;
- * dependent on orientation,
- * a comparative disincentive;
- * not what it claims to be;
- * self-defeating;

or because it.

- * conflicts with other policies;

or * causes concern about the beneficiaries

Judging by replication and the number of "mentions", hypothetical reward is by far the most robust category, encompassing eleven (44%) of the reasons given. The next most robust category is just reward, encompassing just four (16%) of the reasons given, while dependent on orientation is somewhat less robust again, encompassing just three (12%) of the reasons given and conflicts with other policies is even less robust, encompassing only two (8%) of the reasons given. Where this particular group of interviewees is concerned, we should probably treat the last two as well as the remaining four categories as weak.

If we refer back to Figures 116, 151, 179 and 207, we find that reasons encompassed by the dominant category, hypothetical reward, were not evenly distributed between the four universities. They were least prevalent at Hull, where only 17 per cent of the reasons given fell into this category, and most prevalent at Liverpool, where 75 per cent of the reasons given fell into this category. They were next most prevalent at Strathclyde, where this category encompassed 43 per cent of the reasons given. York was much closer to Hull, only 25 per cent of the reasons given there fell into this category. How should we

interpret this? Is it simply a reflection of the relative amounts of IP which have been exploited by the four universities and hence the relative sums available to distribute among the academics concerned? This interpretation does not really hold water, since Strathclyde has been by far the most efficient of the four in this respect, while Liverpool and Hull have been the least efficient in this respect, the extent to which IP generated at Hull has been exploited has depended largely on the efforts of *individuals*, with little or no institutional involvement - and hence little or no income redistribution from the exploitation of IP. It seems more likely that this is a reflection of the relative efficiency of communications in the four universities - that is to say, informal as opposed to formal communications. No instance could be found of the university newsletter detailing the income received from the exploitation of IP at any of these four universities. However, it is arguable that the "grapevine" is more efficient in small or medium-sized universities like York and Hull than it is in large universities like Liverpool and Strathclyde. Concern was expressed in chapter 8 about the fact that none of the nine participating universities appeared to reinforce the incentives they had instituted by publicising instances of people benefitting from them in practice. The dominance of the category hypothetical reward lends strong support to the negative evaluation of universities' sins of omission which was made in chapter 8.

Data on the impact of patents, licenses *etc* on promotion were presented for all four cases in Figures 117 and 118. We can see from Figure 117 that at least 60 per cent were aware of their university's policy - or lack of policy - in this respect. Given the amount of missing data, it is inappropriate to comment on differences between the four universities. Similarly, given the amount of missing data in Figure 117, we should not draw conclusions concerning the beliefs of these interviewees *vis-a-vis* the actual impact of patents, licenses *etc* on promotion. Similarly, Figure 118 has a high proportion of missing

data - sufficiently high as to call into question the validity of any of the percentages given, since any one of the aggregate percentages detailed could be augmented by as much as 36 per cent

The case-by-case analyses sought to establish - as far as was possible, given the proportion of missing data - the reasons given by these interviewees for their views on the impact of patents, licenses *etc* on promotion. The relevant data were presented in Figures 119, 152, 180 and 208. A comparison across all four cases reveals that only one category (holistic approach) was replicated - and then in only two cases. The remaining eight categories (income generation, UGC value, outcomes of research, variable quality, stimulation of activity, sign of ability, discipline-limited activity and value to the university) all feature in just one case apiece. It was felt that examination of all the reasons might suggest a more economical or more insightful way of grouping or characterising them. Figure 233 shows that it proved possible to recategorise them in a way which was both more economical and more insightful. If we accept these (partially new) categories as valid then these particular interviewees explained their views on the impact of patents, licenses *etc* on promotion in terms of

- * their value,
 - * the sign of ability which they give,
 - * a holistic approach to promotion,
- or
- * the validity of the activity itself

Judging by replication and the number of "mentions", value is the most robust category, encompassing six (40%) of the 15 reasons given. The next most robust is holistic approach, encompassing four (27%) of the reasons given, followed by validity of the activity itself, encompassing three (20%) of the reasons given. Given that it is a single-case category encompassing only two reasons, sign of ability should probably be regarded

as a weak category.

Value is an interesting category in so far as it exhibits a number of "dimensions". These range from the perspective that patents, licenses *etc* are indubitably valuable through to the perspective that their value may be variable. The different foci of the perceived value are also interesting, these range from the value to the university - in terms of income or kudos, through the supposed value to the UGC to intrinsic value. Holistic approach is an interesting category, too, in that it bridges the gap between viewing patents, licenses *etc* as an outward *sign* of inner ability and viewing them as an activity to be rewarded in their own right - or not, as the case may be. The four categories are not manifested equally by the four universities. As we have seen, viewing patents, licenses *etc* as a sign of ability was specific to Liverpool. The holistic approach to promotion was particularly prevalent at Strathclyde, while half the interviewees at Hull felt that patents, licenses *etc* should be taken into account by the promotions committee on account of their value.

The Entrepreneurial Exploitation of IP

Data relating to the income earned by academics from the entrepreneurial exploitation of IP were presented for all four cases in Figures 120 and 121. Once again, it is unfortunate that, as a result of piloting the original version of Questionnaire C at Hull, large amounts of data are missing. If we exclude Hull from the analysis, we can see from Figure 120 that at least 74 per cent were either unaware of their university's policy *vis-a-vis* the income earned by academics from the entrepreneurial exploitation of IP - or they were simply wrong. Interviewees from Strathclyde and Liverpool were particularly ignorant in this respect, whereas those at York were the most aware.

Similarly, if we exclude Hull from the analysis, Figure 121 shows us that 63 per cent of the interviewees agreed with their university's policy *vis-a-vis* the income earned by academics from the entrepreneurial exploitation of IP. There are marked differences between the universities, however. At York all the interviewees agreed with their university's policy. Given that it is York's policy not to take a cut of this type of income, effectively these particular interviewees were supportive of a policy which, it could be argued, incorporated incentives to exploit IP entrepreneurially - or certainly did not incorporate disincentives. As we have seen, Strathclyde's policy in this respect was identical to York's - yet only 71 per cent agreed with it. Fourteen per cent were ambivalent, while another 14 per cent disagreed completely. In other words, some of the interviewees from Strathclyde were in favour of a policy which, it could be argued, incorporated potential disincentives to academic entrepreneurship. Liverpool's policy *vis-a-vis* the income earned by academics from the entrepreneurial exploitation of IP was quite different, as we have seen. Liverpool expected to take a cut of entrepreneurial academics' personal earnings - or a cut of their company's annual profits. It could be argued that this constituted a disincentive to academic entrepreneurship; at the very least, it was hardly an incentive. We can see from Figure 121 that these particular interviewees from Liverpool had very mixed views about this. Thirty-eight per cent agreed with this, while a further 38 per cent were ambivalent and 25 per cent disagreed completely. In other words, over one third were in favour of a policy which was hardly an incentive to the entrepreneurial exploitation of IP.

The case-by-case analyses sought to establish why the interviewees held the views they expressed on this subject. The relevant data were presented in Figures 122, 153, 181 and 209. A comparison across all four cases shows that one category (parity) features in three of the four, while two (compensation and preferable mechanisms) feature in two. The

remaining three categories (*quid pro quo*, disincentive and time-limit) are case-specific. How should we interpret this finding? Do the Deans and/or HoDs in these universities have genuinely different reasons for their views on their university's policy *vis-a-vis* the income earned by academics from the entrepreneurial exploitation of IP or is it possible that the groupings and characterisations (*ie* the categories) proposed are not the most appropriate or useful? Given that the four universities' policies differ considerably, it is not really surprising that so many case-specific categories should have been identified. However, examination of the reasons encompassed by both the single-case and the replicated categories uncovered a slightly more economical way of regrouping or recharacterising them. Accordingly, the aggregate data are presented in Figure 236, using these (partially) new categories. From this we can see that these interviewees explained their views on the way the income earned by academics from the entrepreneurial exploitation of IP in terms of

- * a *quid pro quo*,
 - * parity;
 - * preferable mechanisms,
 - * the disincentive effect,
- or
- * the need for a time-limit

Judging by replication and the number of "mentions", *quid pro quo* is the most robust category, encompassing six (35%) of the 17 reasons given. Parity is the next most robust, encompassing five (29%) of the reasons given, while preferable mechanisms encompassed three (18%) of the reasons given. On this basis, disincentive and time-limit should probably be regarded as weak categories. It is noticeable that all these categories except *quid pro quo* are "uni-dimensional". *Quid pro quo* exhibits a number of "dimensions", however. These range from the view that academic entrepreneurs must by definition be devoting less time to their normal academic commitments than they otherwise would - and

the university and the other members of the department should therefore be compensated in some way - through the view that the university provided the necessary infrastructure for the research results to be obtained in the first place to the view that it is wrong to demand a larger income from academics whose companies exploit the IP than it is from, say, ICI, and wrong to expect a *quid pro quo* when the university is assuming none of the risk entailed in exploiting the IP. The dominant view is that the exploitation of IP is not a *bona fide* university activity and the university should therefore be compensated by means of a "tax" on additional personal income for the time taken to pursue such activities. An alternative, less personal means of compensation was proposed by those whose reasons are encompassed by the category preferable mechanisms and an additional refinement was proposed by the interviewee whose reason has been categorised as time-limit. The proportion of interviewees whose reasons were categorised as parity is interesting, too, nearly a third failed to consider academic entrepreneurship on its own merits, preferring to respond to it on a procedural or organisational basis - preferring to lump it together with consultancy, lest academics all rush out and acquire Schedule D tax numbers. This response is indicative of a failure to discriminate between the demands made by a company seriously attempting to exploit "hard" or "soft" IP and a facile attempt at "tax" evasion. If universities were prepared to become involved in one way or another in academic spin-off companies, one would imagine that it should not be too difficult to discriminate between the two.

Data on the impact of the entrepreneurial exploitation of IP on promotion were presented for all four cases in Figures 123 and 124. We can see from Figure 123 that at least 84 per cent of these interviewees were aware of their university's policy - or lack of policy - in this respect. Interviewees from Strathclyde exhibited the greatest incidence of awareness, interviewees from Hull the lowest incidence. Given the amount of missing

data, it would be unwise to draw too many conclusions with regard to these interviewees' beliefs concerning the impact that the entrepreneurial exploitation of IP was likely to have in practice.

Figure 124 shows us the interviewees' own attitudes to the impact of the entrepreneurial exploitation of IP on promotion. It is evident that at least 52 per cent felt that it should number among the factors to be taken into account. Around 16 per cent thought it should not be taken into account, while some 20 per cent were ambivalent. As we can see, there are marked differences between the four universities. A large proportion of interviewees from Hull and York was in favour of taking the entrepreneurial exploitation of IP into account, whereas only a low proportion of those from Liverpool and Strathclyde was of this opinion. Ambivalence was most prevalent at Strathclyde, whereas the view that the entrepreneurial exploitation of IP should not number among the factors taken into account for promotion was most commonly expressed at Liverpool.

The case-by-case analyses sought to establish the reasons for the views expressed by the interviewees. The relevant data were presented in Figures 125, 154, 182 and 210. A comparison across all four cases reveals that two categories (benefit to university and sign of ability) feature in two cases, while the remaining six categories (appropriate skill, inappropriate, contribution to community, holistic approach, appropriate activity and overly narrow promotion criteria) are case-specific. It was felt that examination of all the reasons given might suggest a more economical or more insightful way of grouping or characterising them. Figure 349 shows that it proved possible to recategorise them in a way which was both marginally more economical and more insightful. If we accept these (partially new) categories as valid then these particular interviewees explained their views on the impact of academic entrepreneurship on promotion in terms of

- * its value;
 - * the sign of ability which it gives;
 - * the validity of the skills inculcated by academic entrepreneurship;
 - * the validity of the activity itself;
- or
- * an alternative reward system

Judging by replication and the number of "mentions", validity of the activity itself is the most robust category, encompassing five (28%) of the 18 reasons given. Value and validity of the skills inculcated are next most robust, each encompassing four (22%) of the reasons given, while sign of ability is somewhat less robust, encompassing three (17%) of the reasons given. On this aggregate basis, alternative reward system must be regarded as a weak category; it is specific to Strathclyde and encompasses only two reasons

Noticeably, with the exception of validity of the activity itself, all these categories are "uni-dimensional". However, this last category encompasses dimensions ranging from the view that academic entrepreneurship should be taken into account by the promotions committee because it is a valid activity *per se*, through the view that it is valid in particular disciplines to the view that it is not a *bona fide* university activity and should not be rewarded as such, and onto the view that academic entrepreneurship should probably be counted as a negative factor on account of its supposed diversionary affect. The more negative views of the preferred impact of academic entrepreneurship promotion were expressed exclusively by Deans and/or HoDs from Liverpool, while the more positive views were expressed by interviewees from York and Strathclyde. On the other hand, as we have seen, the interviewees whose reasons were categorised as alternative reward system both came from Strathclyde and it could be argued that these reasons should be subsumed within the former category

The three categories sign of ability, validity of the skills inculcated and validity of the activity itself illustrate similar perspectives to those identified in relation to the impact of patents, licenses *etc* on promotion Validity of the skills inculcated bridges the gap between viewing academic entrepreneurship as an outward *sign* of inner ability and viewing it as an activity to be rewarded in its own right - or not, as the case may be.

CHAPTER 11

11 EXPERIENCE AND VIEWS OF ENTREPRENEURIAL ACADEMICS: CASE-BY-CASE AND CROSS-CASE ANALYSES

11.1 Introduction

Towards the end of chapter 6 this investigation was characterised as one which employs a non-holistic, multiple-case design. That is to say, the investigation consists of a number of case studies, each of which involves multiple, embedded units of analysis, to use Yin's terminology (Yin, 1989) Chapter 11 focusses on one of those embedded units of analysis - entrepreneurial academics. The objective of chapter 11 is to analyse the data elicited - which might have been presented in narrative form as the third section of the case study narratives, had it been acceptable to present the data in this way ⁽¹⁾ - and to identify categories, where appropriate, with a view to developing hypotheses - and, hopefully, to contribute to (embryonic) substantive theory

The analytical approach employed was outlined in chapter 6 and demonstrated in chapter 10 Accordingly, section 11 2 will introduce the interviewees *en masse*, in order not to jeopardise their anonymity. However, section 11 3 will be devoted exclusively to Hull, section 11 4 to Liverpool, section 11 5 to Strathclyde and section 11 6 to York Following the pattern established in chapter 10, section 11 7 will be devoted to a comparison across all four cases. It is the objective of this section to explore the extent to which there is cross-case replication in relation to the experience of entrepreneurial academics, to establish whether any of the four cases are exceptional in any sense - and if so, in what manner and why, if this can be established

Consideration will be given in the final chapter, chapter 12, to the question of whether any replications or exceptions identified in the preceding section suggest any hypotheses or possibly embryonic substantive theory

11.2 Introducing the Interviewees and their Enterprise(s)

The manner in which the interviewees were identified and selected was outlined in chapter 6.5.2, sections (iii) and (iv). Candidates for selection ranged from academics who were still in post on a full-time or part-time basis to former members of the academic staff of the university concerned, who had left for one reason or another (*eg* to devote more time to their entrepreneurial activities, to take up employment elsewhere, to take early retirement or to retire in the conventional manner *etc*). Similarly, the enterprises with which they were associated ranged from independent academic spin-off companies, joint ventures, university companies and/or commercial arms of their department/school/faculty to the acquisition of existing (third party) companies. The enterprises concerned could be in the process of gestation, "alive and well" or moribund, those which were "alive and well" or moribund could have undergone any number of status changes (*eg* university company to joint venture, or independent to subsidiary of another company/consortium). The relationship of candidates for selection to the enterprise(s) in question might range from ongoing to terminated.

Six entrepreneurial academics were interviewed at Hull, eight at Liverpool, six at Strathclyde and six at York. Contrary to information received, one of the interviewees at York transpired to be an employed manager - and to have had this status from the outset, as opposed to having been a current or former entrepreneurial academic, with the result that the data, while interesting, bore little resemblance to the data sought. As a result, the data obtained in the course of this interview have not been treated as a case-within-a-case, like the other entrepreneurial academics, the data have not entirely been excluded from the analysis, however. *In toto*, then, this chapter focusses on the data elicited in the process of interviewing 25 entrepreneurial academics from four universities.

Case Analysis:
Hull University

11.3 Hull University

11.3.1 Origins

The six interviewees from Hull were asked what idea(s) they had hit upon which were being/had been exploited via the eight enterprises with which, as a group, they were associated - and how they had got their idea(s). As Figure 239 shows, the source(s) of their idea(s) varied considerably. Efforts to group and characterise these sources into a number of categories yielded the following six categories. These particular entrepreneurs got their business ideas from:

- * grant-aided research;
- * contract research/consultancy,
- * role models,
- * a supposed market,
- * evidence of demand

Clearly, these categories could be reduced to just four, if grant-aided research were grouped together with contract research/consultancy, and supposed market were grouped together with demand. However, it was felt that this might be practising reductionism for the sake of it.

In view of the commonly levelled criticism that academics tend to be preoccupied more by technology "push" than by market "pull", it would have been interesting to categorise the initial idea for their enterprises in this way, too. Unfortunately, this question was not explicitly posed. However, the source of some ideas (those categorised as demand, supposed market) suggests that market "pull" was involved - or at least the *perception* of market "pull". Moreover, those who cited sources categorised as contract research/consultancy must have been aware of a degree of market interest (Of course, in the light of subsequent events, interviewees some could be embellishing the actual source

of their idea(s) - consciously or sub-consciously. If this is the correct interpretation, it would appear that relatively few of these particular exploitable ideas resulted purely from technology "push". Indeed, only in one case does the transcript unequivocally indicate that the source of the entrepreneurial idea was essentially a question of technology "push" rather than market "pull" or a combination of the two - and that is the source categorised as role model

All six interviewees volunteered information on their motives in pursuing their entrepreneurial idea(s). As Figure 240 indicates, upon examining the reasons they gave, it was felt that four categories of motive emerged. These particular academic entrepreneurs were motivated by:

- * income generation;
 - * for personal fulfilment,
 - * technology promotion
- and/or
- * reduction in pressure on the department.

11.3.2 Business Experience, Role Models, Networks

Efforts were made to establish whether these academic entrepreneurs from Hull had any business experience prior to founding/co-founding their first enterprise, especially small business experience. As Figure 241 shows, none of the six had any business experience as such. Moreover, although two had worked outside the university, only one had worked in industry/commerce - in a fairly junior research capacity, which was unlikely to give him much insight into business.

The interviewees were then asked whether any of their close family had owned or run a small or medium-sized business. As we can see from Figure 242, four of the six academic

entrepreneurs came from families which ran their own businesses, these were all very small businesses (<20 employees), three out of the four were trades-oriented rather than professional. Significantly, perhaps, one of the two whose families did not have their own business reported that the enterprise he had founded had not been his idea, but his supervisor's

The interviewees were next asked whether, prior to setting up their first enterprise, they had known/know of any other *academics* who had set up in business - either at their own university or any other. Figure 243 reveals that five of the six reported that they had known/know of other entrepreneurial academics. One had known that a fellow member of the same department had founded/co-founded a business, three had known of academic entrepreneurs from the same university; the last had known three academic entrepreneurs from other UK universities - one of whom he described as his "great academic rival".

Of the five interviewees who had known/know of other academic entrepreneurs, only one had made use of what was potentially a useful network, as Figure 244 shows. This particular interviewee had taken the trouble to discuss his plans with all the academic entrepreneurs he had known/know of, despite the fact they came from other UK universities. He had also talked to the founder of the electrical discount store Comet, whom he knew socially. He reported that he had not found these discussions of great benefit - largely because he had felt that the three academic entrepreneurs were involved in businesses which bore little or no resemblance to the business he was contemplating starting, while the founder of Comet had tried to discourage him from setting up in business. (Given that the business he founded had 60 employees and was turning over £2.5m *per annum* a few years later, it is perhaps fortunate that he ignored this advice!) Two of the four who had made no use of their potentially useful network gave no reason,

the third explained that he had not taken the business very seriously at first, while the fourth commented that he would have made use of this network, had the university taken the trouble to introduce him to its own academic entrepreneurs

11.3.3 Interaction with the University

The six interviewees were asked whether, when first seriously considering their business idea, they had known what their university's policy was *vis-a-vis* academics starting up business ventures. As we can see from Figure 245, all six reported that- on the first occasion, at least, they had had no knowledge whatsoever when the thought first struck them. One of the six had felt that ignorance of the policy - if, indeed, there was any - was irrelevant since he intended to make an immediate, clean break with the university, another had assumed he would be allowed to devote his (apocryphal) "day per week" consultancy time to the company, a third had eventually asked around and discovered the existence of two academic spin-off companies, which encouraged him to progress his idea; a fourth had decided what the university's policy ought to be - and was prepared to fight to obtain agreement, if necessary

None of the six tried to operate a business venture covertly One left, as planned, as for the other five - Figure 246 shows which member of the university each initially approached with a view to discussing his plans - and to whom, if anyone, each subsequently spoke, it takes in the first/only entrepreneurial venture founded by the academics in question, and also subsequent ventures, where appropriate; finally, it also shows the interviewee's status at the time the approach was made; Figure 247 shows each would-be academic entrepreneur's objective(s) in discussing their plans with the representative(s) of the university indicated in Figure 246. Figure 248 details the five would-be academic entrepreneurs' expectation(s) of the outcome of those discussions,

while **Figure 249** details the university's actual response to their request

Lacking guidance from an explicit policy, it is clear from **Figure 246** that these would-be academic entrepreneurs from Hull hit upon fairly diverse solutions to the problem of identifying a representative of the university with whom to discuss their entrepreneurial plans. Interestingly, **Figure 247** shows us that four of the five had very specific objectives, only one went seeking advice on the best way forward. We can see from **Figure 248** that they had rather diverse expectations, however. Where three of the seven enterprises were concerned, the would-be entrepreneurs expected the university to agree to their objectives, in another instance - having been refused once already, the would-be entrepreneur was doubtful about achieving his objective, in a further two instances, the would-be entrepreneurs did not know what to expect - indeed, one was clearly prepared for a refusal - and a fight.

Figure 249 suggests that the university's actual response did not necessarily bear any relation to these would-be academic entrepreneurs' expectations. It may have borne some relation to the nature of their proposal, however; it is noticeable that sooner or later those wishing to set up companies were given permission, while those wishing to set up departmental commercial arms were not. However, **Figure 249** strongly suggests that the choice of university representative was possibly the most crucial factor. If a would-be academic entrepreneur did not go directly to/get referred to either the Registrar or the Vice-Chancellor, the outcome was unlikely to be satisfactory from their perspective. The two who put their faith in their HoD/the ILO to take appropriate steps on their behalf did not achieve their original objectives, while - with one exception - the others did. (The only exception dates back to the early 1970s, when the then Vice-Chancellor "nearly had a fit" upon hearing what was proposed.) Both the would-be academic entrepreneurs who

mistakenly put their faith in an intermediary went ahead with their entrepreneurial venture in a different guise, notwithstanding the lack of positive response - and both encountered serious difficulties in their relations with different members of the university. When considering these findings, it must be remembered that these six in no way constitute a sample. We should not conclude that nowadays would-be academic entrepreneurs who lay their entrepreneurial plans directly before the Registrar and/or Vice-Chancellor would necessarily elicit a positive response.

The six interviewees were next asked whether the university had played any role in helping them set up their business venture. In this context, help was defined as making available (on whatever basis - *eg gratis* or for some form of payment) equipment, instrumentation, accommodation, technical or secretarial support staff, communications, in-house professional advice, referral to external sources of professional advice, funding of any sort or assistance with infrastructure (*eg practical* assistance things like with company registration, billing, debt collection, tax, VAT, administration, publicity *etc*, or any other form of help which the interviewees cared to mention). As we can see from Figure 250, where six of the eight enterprises founded/co-founded by these interviewees were concerned, the interviewee's immediate response to the question was to report that the university had not played a role in helping them set up their business venture; only two recognised immediately that the university had helped them in one or more of the outlined ways. Following further questioning, it became clear that another three had actually been helped by the university in one way or another, though it had not immediately occurred to them that this had been the case. In only three instances had the university played no part at all in helping the would-be academic entrepreneurs in question to set up in business - and one of those three was a business founded prior to the interviewee taking up employment at Hull.

Figure 251 details the types of assistance provided by the university, both initially, in the lead-up to and the aftermath of start-up, and later on, once the business was established. As we can see, the most common forms of assistance initially were accommodation and the use of communications. It would appear that assistance with funding was rare, as was the use of equipment/instrumentation and technicians, surprisingly. The only two forms of assistance apparently never provided were in-house professional advice and referral to external sources of professional advice. Since at least two of these interviewees reported that they had discussed their plans with the ILO, we must presumably assume that they did not feel these discussions could be characterised as in-house professional advice. Finally, **Figure 251** shows that with the passing of time, as a group these businesses tended to depend less on the university for their particular types of assistance - but, noticeably, not significantly less. Later, although dependency on the university for such assistance diminished slightly, these forms of assistance were still the most common.

The six interviewees were asked whether they had been satisfied with the role (if any) which the university had played in helping them to set up their business(es). **Figure 252** indicates their satisfaction levels in relation to each enterprise with which the six were associated, excepting the one founded prior to the interviewee taking up employment at Hull. It is evident that where these particular academic entrepreneurs were concerned, satisfaction levels at Hull varied enormously. In over a quarter of instances, the entrepreneurs indicated that they were satisfied, but equally, in over a quarter of the instances, they indicated that they were not really satisfied. There is more to this than meets the eye, for in both instances where the entrepreneurs expressed complete satisfaction, that satisfaction derives from the fact that the university played no role at all in helping them set up their business. In one instance, the entrepreneur wanted no formal ties with the university, preferring to maintain informal ties via *eg* periodic teaching,

Masters students for summer placements *etc.* In the other, the entrepreneur would not have minded the university playing a role in his company, but felt that it would have imposed an unfair burden on the university.

All those who expressed anything but complete satisfaction were asked why they had been dissatisfied to a greater or lesser degree. Figure 253 details their responses. Attempts to group and characterise the reasons for their dissatisfaction them yielded five fairly distinct categories. These particular interviewees attributed their dissatisfaction to the university's:

- * lack of vision;
- * lack of guidance;
- * lack of recognition,
- * risk aversion;
- and/or * wimpishness.

11.3.4 Intellectual Property Rights

The six interviewees were asked whether the enterprise(s) they had founded/co-founded were intended to be "hard" or "soft" - or a combination of the two. As Figure 254 shows, at the outset four of the enterprises were intended to be "hard", "widget-based" operations, while two were intended to be "soft", R&D/consultancy-based operations; the other two were intended to be a combination of "hard" and "soft". Having established this, the interviewees were then asked whether they had needed to obtain a license from the university - or, indeed, any other organisation - to allow them to legally exploit their business idea.

Despite the fact that six of these enterprises were intended at the outset to be "hard" or a combination of "hard" and "soft", none of the six had obtained a license. The only two

companies to have obtained licenses were the two "soft" companies, one required a license from an external research sponsor to use for consultancy purposes a tool which the academics concerned had developed, supposedly under contract, the other required licenses from a number of third parties to use their commercially-available products in the course of the service they provided

Figure 255 summarises the reasons given by the other academic entrepreneurs for not having a license (It is worth noting that some were unable to respond directly to this question, it was not unusual for the investigator to have to pose a series of supplementary questions in order to arrive at the answer - indeed, one of the first academic entrepreneurs remarked that until it became necessary to persuade venture capitalists to invest in the company, he had not know what IPR was) In two instances, the businesses were exploiting software - over which Hull made no claim until 1990-91 One of the two entrepreneurs had been quite unaware that ownership might be an issue The other was aware that the university could claim ownership of software which he wrote after the start of the 1990-91 session - particularly since it was almost invariably written in the course of Research Council-funded projects; however, since the university had made no mention of a license being required for software written after the beginning of the 1990-91 session, he had decided not to raise the subject either In another two instances, the businesses were exploiting instruments which the academic entrepreneurs had designed in their capacity as academics and which had been built in the department by departmental technicians However, even though the university could claim joint ownership today, given the absence of an IPR policy at the time, it seems unlikely that the university could have made such a claim. (This could only be determined conclusively by expert scrutiny of the terms of the 1977 Patent Act and the terms and conditions of employment of the academics concerned, and since some of the technology predates 1977, even this would be of dubious value) In

another instance, a business was exploiting technology which was peripheral to the academic entrepreneur's PhD research; since the Research Council in question did not make a claim over such IPR at the time and nor did the university, it presumably belonged to the student

The academics whose companies had been obliged to obtain a license for the IPR they planned to exploit were asked whether they had found the negotiations difficult, and whether they had been helped by anyone. In the first instance, the academics concerned had found it extremely difficult to negotiate the terms of the license with the government department which had laid a claim to the IPR, they described the government department's negotiation technique as illogical and based on "*sheer brute force*" ... "*we've got bigger guns than you*". Neither the university nor any other agency helped them, and owing to concern about the likely expense, they did not commission professional assistance. Their difficulties were exacerbated by their belief that the government department had no right to the IPR in the first place - and their perception that the university was not prepared to challenge the government department. In the second instance, the company needed to obtain licenses to use standard, commercially available tools - for which a fairly standard commercial charge was made and no real negotiation skills were required.

Neither of the companies acquiring licenses was obliged to make any return to the university, since the university either had no claim over the IPR or was not prepared to challenge a counter-claim to ownership. Where two of the other six enterprises were concerned, however, a financial return to the university was arranged. In one instance, the academics who co-founded the enterprise had *volunteered* to covenant a percentage of their turnover to the university. The Finance Officer had suggested 5 per cent, but the academics had chosen to covenant 10 per cent, with no restrictions or conditions as to the

way the university used this income - indeed, the academics never enquired how it was spent. This arrangement continued for several years, until the enterprise moved into external premises and had to start to pay a commercial rent. In the other instance, the enterprise was a joint venture with the university, it was therefore entitled to receive a share of any dividend declared - and ultimately, to sell its share of the business.

11.3.5 Demands of the Business

The interviewees were asked a series of questions which, it was hoped, would give some indication of the scale of their businesses and the demands which their businesses placed upon them. At the outset, as **Figure 254** revealed, half of the enterprises started by these academic entrepreneurs were intended to be "hard", "widget-based" operations, a quarter were intended to be "soft", R&D/consultancy-based operations, while the remaining quarter were intended to be a combination of "hard" and "soft". The interviewees were first asked when the enterprise(s) with which they were associated had started up, whether they personally were still in business, whether the enterprise(s) they had founded were still in business, and if so, whether the character of their enterprise(s) had changed substantially in the intervening years.

In order not to jeopardise the anonymity of the interviewees, the start-up dates of each enterprise have not been individually listed. However, **Figure 256** shows the age range, the average age and the aggregate number of business years associated with the eight enterprises founded/co-founded by the six. Clearly, at least one of these enterprises is only one year old, but the age range of 1-13 years, the average age of 7.25 years and 58 aggregate business years should indicate that several of these businesses had survived beyond the first year, in which it is estimated that a significant percentage of new businesses fail. As we can deduce from **Figure 257**, five (83%) of the six would-be

academic entrepreneurs were still in business when they were interviewed in 1990 - though not necessarily in the context of the first business they had started (However, one was effectively an employee in what had formerly been his company; due to under-capitalisation at the outset, he had been obliged to seek further funding - a search which ended with the company being acquired by a holding company, the academic concerned still had a fair degree of autonomy in running the business, nonetheless) The sixth interviewee had chosen to retire from his business nine years after founding it. We can also deduce from Figure 257 that two (25%) of the eight enterprises founded by these academics were no longer in business in 1990 (Neither had been a failure, however; in both instances rationalisation had led to the business's activities being taken over by the academic entrepreneur's second enterprise) Finally, Figure 257 shows us that seven (88%) of the eight enterprises had maintained their original character, the eighth had been obliged to change its character, however, transforming itself from a "hard", "widget-based" company into one which was a combination of "hard" and "soft".

The interviewees were then asked whether, at the outset, they had made long-term projections about the future of their enterprise(s) As we can see from Figure 258, in only four instances had these academic entrepreneurs actually made a long-term projection. One of those who had not commented that in retrospect he could see that he had drifted into the business; he had certainly never envisaged it turning over £3m p a , as it later did Another remarked that with the benefit of hindsight he could see that he had not really been serious about the business at first, regarding it as "a bit of fun"; it was not until he had required capital to expand that he had sat down and written a business plan. Figure 259 reveals the projections made with regard to four of the eight enterprises founded at Hull As is evident, it was felt that categorising these projections could yield interesting results This led to two being categorised as ambitious, "infinite" projections, while the

other two have been categorised as finite but growth-oriented projections.

Attempts were made to gauge the actual size of these eight businesses in terms of the annual turnover achieved and the number of employees. This could not be done in an entirely satisfactory manner, since it was impossible to obtain strictly comparable data. Ideally, the investigator would have wished to establish for each enterprise the turnover for the financial year ending 1990 and the number of employees, and relate this information to the age and the character of the business. As we have seen, however, some enterprises were no longer in business in 1990, where others were concerned, interviewees had parted company with the enterprise some time (upto four years) before 1990 and did not have up to date information, in one isolated instance, the interviewee refused to reveal the turnover of his business. It was felt that some impression of the actual growth of most of these enterprises could nonetheless be gauged by dint of establishing the turnover and the number of employees in 1990 or the last year the enterprise was still in operation or the last year in which the interviewee was associated with the enterprise. Figure 260 indicates the range of annual turnover reported in relation to six of the eight businesses, the average turnover and the aggregate turnover for these six. With an annual turnover ranging from £35,000 to £2,500,000 and an average turnover of £667,500, it is clear that - eventually, at least - many of these were being run as fairly serious businesses, not as hobbies by dilettantes. Figure 261 reveals the range of employees, the average number of employees and the aggregate number of employees in the eight businesses being investigated in this study.

The interviewees were next asked whether they had gone into business as sole traders or whether they had had business partners at the outset - and if so, how many, and who they had been. As Figure 262 shows, only one interviewee had attempted to go into business

alone - a *modus operandi* which he did not repeat when starting his second business. In six instances, the interviewee had gone into business with one partner, in the seventh, the interviewee had gone into business with two partners. Figure 263 reveals how, in relation to each enterprise with which they were associated, the interviewees had identified their business partners. It is evident that the majority were fellow academics. Other sources ranged from the would-be entrepreneur's wife to the university and/or a private sector individual. This last business partner was the only one who could be described as a "professional", being an accountant from a famous UK management accountants. There is no evidence that any of the other business partners had *bona fide* business skills or experience. (It is worth noting that by 1990 only four of the eight enterprises had taken on board additional partners - usually as a result of the need for venture capital to fund expansion.)

Given the lack of business experience of both the would-be academic entrepreneurs and their business partners, the interviewees were asked which role(s) they had assumed at the outset in the enterprises which they had founded/co-founded, which role(s) had been assumed by their business partners and whether they had taken on employees with managerial responsibilities. It is clear from Figure 264 that at the outset none of these enterprises had taken on employees with managerial responsibilities - though one was enterprising enough to acquire the occasional unpaid services of an experienced financial director. So, initially, at least, four of these would-be academic entrepreneurs and their inexperienced partners had shouldered the burden of both technical development and business development without day-to-day professional assistance - and a fifth managed without the support of a partner, either. (Eventually, it is worth noting, four of the eight enterprises had taken on employees with specific business skills which had been lacking - ironically, the same four that acquired additional business partners. One had acquired a

financial director; another a managing director; a third a general manager, a sales manager and a technical manager; the fourth had acquired a managing director and metamorphosed his own role into that of technical director).

Finally, given the burden apparently shouldered by most of these academic entrepreneurs, they were asked how much time they had devoted to the business on average - per week/month/year - and whether they had devoted this time during evenings and/or weekends and/or during the working week (*ie* Monday to Friday, 9-5). Figure 265 reveals the difficulty inherent in trying to establish an objective, quantifiable, comparable measure of how much time each devoted to his entrepreneurial activities in an organisation which had no use for time-sheets (*ie*. the university) The result is at best impressionistic.

11.3.6 Interaction with the Department

It was felt that an investigation of the interaction of these academic entrepreneurs with their department might be a more productive line of analysis The interviewees were first asked to answer as honestly as they could and say whether they thought their entrepreneurial activities had ever impacted on their academic commitments, and if so, whether they perceived this to be a positive or a negative impact. As we can see from Figure 266, two felt that there might have been a negative impact, though one suggested this would have been sporadic, while the other felt that there had been no negative impact until his company was actually up and running In contrast, four out of the six felt that their business activities had impacted positively on their academic commitments. Figure 267 presents the views of five of the six on the particular ways in which they felt their business activities had impacted on their academic commitments, be it positively or negatively Attempts to group and characterise them yielded three fairly distinct categories These particular academic entrepreneurs saw the impact of their business

activities on their academic commitments as.

- * diversionary;
- * beneficial to teaching,
- and/or * generating improved efficiency

As we can see, both those who admitted to a negative impact characterised this as a general diversionary impact. Judging by the number of "mentions", perceptions of benefit in relation to teaching and general efficiency were equally common, and more common than the general diversionary impact.

The interviewees were then asked whether they had ever asked any favours *vis-a-vis* their academic commitments. Figure 268 indicates whether they recollected having asked any favours (formally or informally), in order to accommodate the demands of their business commitments. As we can see, only one admitted to having asked any kind of favour, namely a half-time contract, his request was supported by his HoD and was duly granted

Next, the interviewees were asked how their colleagues had reacted to their business activities. As Figure 269 reveals, between them the six academic entrepreneurs apparently elicited a wide range of reactions. Efforts to group and characterise these reactions yielded the following nine categories.

- * short-changing the university;
- * disgust,
- * jealousy;
- * resentment,
- * concern;
- * inscrutability;
- * neutrality;
- * support,

and/or * pride

Clearly, we have here almost as many categories as purported reactions. However, it was felt that there were subtle but important differences between, say, disgust, jealousy, resentment and concern, and that simply grouping them into fewer, more embracing categories might constitute the kind of reductionism which qualitative research usually strives to avoid. Moreover, there is nothing to prevent us from grouping these categories into a variety of different and partially overlapping "super-categories". So, for example, we could group them into.

- * negative (short-changing the university, disgust, jealousy, resentment, concern);
 - * neutral (inscrutability, neutrality),
- and
- * positive (support, pride)

From the number of categories within each "super-category" and the number of "mentions", we can deduce with ease that as a group these particular academic entrepreneurs perceived their colleagues' reactions to be predominantly negative. Interestingly, two of the six academic entrepreneurs had occupied the position of HoD when they were launching their business. The reactions of their particular colleagues have

been categorised in one instance as pride at first, followed by concern, and in the other instance as neutral. It would appear that these two entrepreneurial HoDs perceived their colleagues' reactions to be somewhat less negative than did entrepreneurial academics who were more junior at the time. It is worth noting that both were installed as HoDs for life, not on a temporary basis, and that in the course of being interviewed, one commented (not entirely jokingly) that his staff would not have dared to express a negative view of his activities

Asked how their HoD had reacted to their business activities, those who were more junior at the time gave very divergent answers, as Figure 270 shows. One HoD had demonstrated his support both morally and practically, having devoted considerable energy to persuading the Registrar not to revise the idiosyncratic relationship between the department and the academic's enterprise, to formalising the symbiosis and synergy which derived from that idiosyncratic relationship. A second was described as neither critical nor supportive - an interesting judgement in view of the fact that, interviewed in the course of this investigation, the HoD in question reported that he had "stuck his neck out" and ignored university policy in order to provide practical help for this particular academic entrepreneur. A number of possible explanations spring to mind in relation to this discrepancy. Since the investigator has objective proof of the HoD's assertion and there was no reason to doubt the academic entrepreneur's sincerity, the most likely explanation is that the academic entrepreneur was unaware of this aspect of university policy, if this was the case, it is clear that communication between the HoD and the academic entrepreneur was not as good as it might have been. The HoD whose opinions were changeable had been reasonably supportive at first, while the academic's entrepreneurial aspirations for the department were at the discussion stage. However, when the HoD failed to deliver what this particular interviewee expected of him within what he perceived

to be a reasonable timescale - and this particular would-be academic entrepreneur had relied upon his HoD to act as an intermediary with the university, the interviewee had focussed his entrepreneurial aspirations on an independent academic spin-off company, instead - and proceeded to realise his aspirations. Upon discovering this - by means of a report in the media - his HoD's reaction had been to leave, in the middle of the proceedings, the out-of-town conference he was attending in order to deal with this unexpected "problem". The problem, according to this particular interviewee was not that he had transferred his entrepreneurial aspirations from the department to an independent spin-off company, but that he had set up and publicised a company at all. It is worth noting that this occurred some time ago - in the late 1970s, to be more precise; however, this was by no means the first company to be set up by academics from Hull - nor even the first independent academic spin-off company. In the light of this, perhaps, the HoD's subsequent more neutral attitude may have been the result of a more considered reaction.

The six academic entrepreneurs were next asked whether they had researched or even considered Hull's promotion criteria prior to setting up in business, whether they had been promoted since starting their first business and whether they were worried about their promotion prospects. (In the context of this investigation, promotion was interpreted in the widest sense, ranging from promotion from Research Fellow to Lecturer to promotion from Professor to HoD/Dean/Pro-Vice-Chancellor *etc.*) As we can see from Figure 271, only one of these would-be academic entrepreneurs had even considered the university's promotion criteria prior to setting up in business - but he had not sought to obtain the explicit criteria. Figure 271 also reveals that three out of the five who were still members of the academic staff had been promoted/offered promotion after starting their first business. Interestingly, one had been offered promotion but had turned the promotion down, on the grounds that he had no interest in the responsibilities entailed in accepting it

Finally, **Figure 271** shows that two out of the five had not been promoted since starting their first business - and that one had started to worry about his promotion prospects

The six academic entrepreneurs were then asked whether, at the outset, they had contemplated leaving the university in order to devote time and energy to their business(es) without having to worry about the attitude of their colleagues and their HoD - or their promotion prospects. As **Figure 272** reveals, where one enterprise was concerned, the interviewee associated with it had contemplated leaving at the outset - and we see from **Figure 273** that one - the same one - did, indeed leave. The remaining five were then asked whether they had later contemplated leaving, some time after starting their businesses. As **Figure 274** indicates, where a further three enterprises were concerned, the interviewees associated with them had contemplated leaving, and **Figure 275** shows us that all three did leave in due course.

All the academic entrepreneurs who left the university were asked what had made them decide to leave. **Figure 276** details the reasons they gave and shows that efforts to group and characterise those reasons led to the identification of five distinct categories. These particular academic entrepreneurs left

- * to achieve personal fulfilment;
- * because of departmental restructuring,
- * due to rejection of change,
- * because of promotion prospects,
- and/or * as a demonstration of commitment to investors

Chapter 4 introduced the concept of entrepreneurship being a response to one of two types of stimulus. In this scenario, entrepreneurs are either "pushed" into entrepreneurship by

events happening in or characteristics of the organisation in which they were previously located, or they are "pulled" towards entrepreneurship by attributes of the activity of entrepreneurship itself, or the particular manifestation of the entrepreneurial venture in question, or perhaps by events or opportunities to which the entrepreneurial venture might respond - such as capitalising on a particular market opportunity. If we group the categories identified in terms of these two "super-categories", we obtain the following result.

- * push (departmental restructuring, rejection of change promotion prospects),
- * pull (demonstration of commitment to investors).

Personal fulfilment is not so straightforward to "super-categorise" in this manner. The name of the category suggests something intangible, unquantifiable but unquestionably alluring - *ie* a "pull" factor. However, close examination of the reasons which fall into this category reveals that they all encapsulate a rejection of academia, or of certain aspects of academic life, as the interviewees concerned had experienced it. On balance, then, it is probably more appropriate to "super-categorise" it as a "push" factor. In that case, it is evident that these particular academic entrepreneurs from Hull were not "pulled" into forsaking the university for their businesses, they were all "pushed" by events happening in or attributes/perceptions of attributes of the university itself. Even the interviewee who cited the one "pull" factor (demonstration of commitment to investors) also cited a "push" factor in the same breath. Of course, if this is not the appropriate way to "super-categorise" personal fulfilment, then we are not entitled to reach this clear-cut conclusion. In that event, just half of the reasons given for leaving constitute "push" factors, while the other half constitute "pull" factors.

Finally, the two academic entrepreneurs who had stayed in the university were asked why they had stayed, instead of leaving (partially or wholly) to devote more time to their business interests. Figure 277 details their responses, which, it is clear with the benefit of hindsight, concentrate more on what it would take to make them consider leaving, rather than why exactly they had stayed. However, in terms of the "push" versus "pull" "super-categorisation" attempted in relation to those academic entrepreneurs who left the university, their responses are of considerable interest. It is clear that neither would leave unless they were "pushed". The corollary to this is presumably that there were certain (unspecified) attributes of academic life which "pulled" them towards staying in the university on a full-time basis.

Case Analysis:
Liverpool University

11.4 Liverpool University

11.4.1 Origins

The eight interviewees from Liverpool were asked what idea(s) they had hit upon which were being/had been exploited via one or more of the fourteen enterprises with which, as a group, they were associated - and how they had got their idea(s) As Figure 278 shows, the source(s) of their idea(s) varied considerably Efforts to group and characterise these sources yielded the following six categories These particular academic entrepreneurs got their business ideas from

- * an academic tool,
 - * contract research/consultancy;
 - * a role model;
 - * supposed demand,
 - * demand,
- and/or *
- * in pursuit of tax avoidance

Clearly, these categories could be reduced to just five if supposed market were grouped together with demand. However, it was felt that this might be practising reductionism for the sake of it, where it was actually unwarranted.

In view of the commonly levelled criticism that academics tend to be preoccupied more by technology "push" than by market "pull", as already mentioned, it would be interesting to categorise the initial idea for their enterprises in this way, too Unfortunately, this question was not explicitly posed. However, the source of some ideas (tax avoidance, demand, supposed demand and, in this case, role model) strongly suggests that market "pull" was involved - or at least the *perception* of market "pull". Those who cited sources categorised as contract research/consultancy must surely have been aware of a degree of market interest, too. (Of course, in the light of subsequent events, interviewees citing reasons categorised as contract could be embellishing the actual source of their idea(s) -

consciously or sub-consciously) If this is the correct interpretation, it would appear that relatively few of these particular exploitable ideas resulted purely from technology "push" - and the transcripts indicate that we should be wary of assuming that a source like academic tool necessarily falls into this category.

All eight interviewees volunteered information on their motives in pursuing their entrepreneurial idea(s). As Figure 279 indicates, upon examining the reasons they gave, it was felt that seven categories of motive emerged. These particular academic entrepreneurs were motivated by

- * personal fulfilment,
 - * third party benefit,
 - * commercial realism,
 - * tax avoidance,
 - * income generation,
 - * corporate venturing,
- and/or *
- * grasping the opportunity

Once again, this could be reduced to just four if commercial realism, tax avoidance and income generation were grouped together in a single category - perhaps "financial benefit". Similarly, corporate venturing and grasping the opportunity could justifiably be grouped together. However, as before it was felt that this might be practising reductionism for the sake of it, for there are clearly subtle but important differences between commercial realism, tax avoidance and income generation

11.4.2 Business Experience, Role Models, Networks

Efforts were made to establish whether these academic entrepreneurs from Liverpool had any business experience prior to founding/co-founding their first enterprise, especially small business experience. As Figure 241 shows, only one out of the eight had any business experience as such. Although four had worked in industry, this had been in a fairly junior research capacity which had given them little or no insight into business.

The interviewees were then asked whether any of their close family had owned or run a small or medium-sized business. As we can see from Figure 242, three out of the eight academic entrepreneurs came from families which ran their own businesses. All three reported that their families had been in business for themselves for generations - on both sides of the family, in one instance. Without exception these were small businesses (<50 employees) - and all but one were trades-oriented rather than professional.

The interviewees were next asked whether, prior to setting up their first enterprise, they had known any other *academics* who had set up in business - either at their own university or any other. As Figure 243 reveals, seven out of the eight reported that they had known/know of other entrepreneurial academics; the eighth thought (erroneously) that his enterprise had been the first at Liverpool, moreover, he reported that he had known of no entrepreneurial academics elsewhere. Of the seven, two had known that fellow member(s) of the same department had founded/co-founded a business; four had known of fellow members of the same university who had done so, three had known of entrepreneurial academics from other UK universities. One reported that he had known of no entrepreneurial academics in UK universities, but that he had encountered some in the US - indeed, an American academic had been his first business partner.

Of the seven interviewees who had known/known of other academic entrepreneurs, only one had made use of this potential network, as Figure 244 shows. This particular interviewee was advised by a member of staff at Liverpool not to get involved with the university's umbrella company, ULTRA; he took this advice, establishing an independent spin-off company instead. One of the six who did not make use of this potential network said that he had preferred to make use of professional advisers; the other five could not say why they had not done so.

11.4.3 Interaction with the University

The eight interviewees were asked whether, when first seriously considering their business idea, they had known what their university's policy was *vis-a-vis* academics starting up business ventures. As we can see from Figure 245, five of the eight reported that they had not known - on the first occasion, at least, what the university's policy was. One said he had known about the rules requiring academics to obtain permission to do outside work, but not about company start-up. Only one said that he had known it was necessary to obtain permission to become a company director, as well as permission to do outside work. However, two of the three who wished to set up a departmental commercial arm claimed to have known what Liverpool's policy was in this respect.

None of the eight would-be academic entrepreneurs had tried to operate covertly - initially, at least. Figure 280 shows which representative of the university each initially approached with a view to discussing his plans - and to whom, if anyone, each subsequently spoke; it takes in the first/only entrepreneurial venture founded by the academics in question, and also subsequent ventures, where appropriate; finally, it also shows the interviewee's status at the time. Figure 281 shows each would-be academic entrepreneur's objective(s) in discussing their plans with the representative of the

university indicated in **Figure 280**. **Figure 282** details the eight would-be academic entrepreneurs' expectation(s) of the outcome of these discussions, while **Figure 283** details the university's actual response to their request

It is clear from **Figure 280** that these would-be academic entrepreneurs from **Liverpool** hit upon fairly diverse solutions to the initial problem of identifying a representative of the university with whom to discuss their entrepreneurial plans. Notwithstanding the fact that **Liverpool** had someone acting as ILO from the late 1960s onwards, in only four out of the nine instances was the initial approach made to the ILO. Interestingly, we can see from **Figure 281** that in almost every instance these would-be academic entrepreneurs had very specific objectives; only one went seeking advice on the best way forward - though even he had thought out the framework in which he wished to operate. **Figure 282** reveals that as a group they had somewhat diverse expectations, however. In four out of seven instances, the would-be entrepreneurs expected the university to agree to their objectives; in another instance the would-be entrepreneur was hopeful that he would achieve his objective; however, two would-be entrepreneurs simply did not know what to expect.

Figure 283 shows that the university's actual response was positive in most instances - indeed, *very* positive in one particular instance - from the perspective of the entrepreneurial academic. However, one approach yielded a response which has been characterised as positive and zero, while another was both positive and negative, and one was entirely negative. Comparison of **Figures 280** and **283** suggests that the choice of university representative was possibly a determining factor: two of the three would-be academic entrepreneurs who approached only their HoD elicited a response which was wholly or partially negative from their perspective, while most of those who went directly or indirectly to either the Registrar or the Vice-Chancellor declared the outcome to

positive. On the other hand, comparison of Figures 281 and 283 suggests that the nature of the proposal may also have been a determining factor, all those who asked permission to set up companies of one sort or another elicited an entirely positive response, while only one of the four who wished to set up a departmental commercial arm elicited an entirely positive response. This may also be a question of timing, however: the one who elicited an entirely - indeed, very - positive response put forward his proposal in the late 1980s, whereas the other three date from the early or mid-1970s or the very early 1980s. There are those who would attribute this discrepancy to the attitude of certain powerful individuals; however, it is difficult to separate out the influence of powerful individuals from the more general ethos which, it could be argued, had also changed over the same period. When considering these findings, it must be remembered that these interviewees in no way constitute a sample. We should not conclude that nowadays would-be academic entrepreneurs who make sure that their entrepreneurial plans are laid before the Registrar and/or Vice-Chancellor would necessarily elicit a positive response.

It is worth noting that none of the three who elicited a response which was negative - or not entirely positive - was deterred by such a response. All three went ahead with their proposed venture - albeit in a different guise in two instances. The one who persevered with his original plan later encountered difficulties in relations between the commercial arm, the department and the university centrally. The other two amended their original plan, each (relatively covertly) setting up an independent company to exploit their idea(s), rather than the departmental commercial arm which they had originally proposed.

The eight interviewees were next asked whether the university had played any role in helping them start up their business venture. In this context, help was defined as making available (on whatever basis - *eg gratis* or for some form of payment) equipment,

instrumentation, accommodation, technical or secretarial support staff, communications, in-house professional advice, referral to external sources of professional advice, funding of any sort and infrastructure assistance (eg. practical assistance with things like company registration, tax, VAT, administration, publicity *etc*) or any other form of help which the interviewees cared to mention. As we can see from Figure 250, where twelve of the fourteen enterprises founded/co-founded by these eight interviewees were concerned, the interviewee's immediate response to the question was to report that the university had not played a role in helping them set up their business venture, only two recognised immediately that the university had helped them in terms of equipment, instrumentation, *etc*. Following further questioning, it became clear that a further six had actually been helped by the university in one or more of the ways outlined, though it had not immediately occurred to them that this had been the case. In only six instances had the university played no part at all in helping the would-be academic entrepreneurs in question to set up in business. Moreover, one of those had founded his first business prior to taking up employment at Liverpool, this same interviewee had opted to run his second business fairly covertly, as had another interviewee, too.

Figure 284 details the types of assistance provided by the university, both initially, in the lead-up to and the aftermath of start-up, and later on, once the business was established. As we can see, the most common forms of assistance initially were use of communications, miscellaneous items like photocopying and stationery, accommodation and use of equipment. Infrastructure assistance - usually with regard to billing and debt collection - was also fairly common initially, as was use of instrumentation, but not use of technicians. It is evident that assistance in the form of in-house professional advice was rare. However, the only form of assistance which was apparently never provided was referral to external sources of professional advice. Finally, Figure 284 shows us that with

the passing of time, as a group these businesses tended to depend less on the university for their particular types of assistance - but, noticeably, not significantly less. Although dependency on the university for such assistance diminished somewhat, these forms of assistance were still the most common.

The eight interviewees were asked whether they had been satisfied with the role (if any) which the university had played in helping them to set up their business(es). Figure 252 indicates their satisfaction levels in relation to each enterprise with which the eight were associated, excepting one founded prior to the interviewee taking up employment at Liverpool and three more founded after the interviewee had left the university. It seems that satisfaction levels at Liverpool exhibited polarisation, with 50 per cent indicating satisfaction while 30 per cent indicated that they were definitely not satisfied. There is more to this than meets the eye, for in two of the five instances where the entrepreneurs expressed complete satisfaction, that satisfaction derives from the fact that the university played no role at all in helping them set up their business. Significantly, in a third instance the interviewee commented that he would have resisted any attempt on the part of the university to become formally involved in the business. This particular interviewee had been advised by an experienced and successful entrepreneur from his own department to make sure his business was completely under his own control and that the university had no say whatsoever in it, or he would regret it.

All those who expressed anything but complete satisfaction were asked why they had been dissatisfied to a greater or lesser degree. Figure 285 details their responses. Attempts to group and characterise the reasons for their dissatisfaction them yielded four distinct categories. These particular interviewees attributed their dissatisfaction to the university's

- * financial profligacy,
 - * greed,
 - * competence,
- and *
- * patronising approach

11.4.4 Intellectual Property Rights

The eight interviewees were asked whether the enterprise(s) they had founded/co-founded were intended to be "hard" or "soft" - or a combination of the two. As Figure 254 shows, at the outset, five of the enterprises were intended to be "hard", "widget-based" operations, while six were intended to be "soft", R&D/consultancy-based operations; the other two were intended to be a combination of the two; (the fourteenth was simply a shell company which could not be meaningfully characterised in this manner) Having established this, the interviewees were asked whether they had needed to obtain a license from the university - or, indeed, any other organisation - to allow them to legally exploit the IP in question. Despite the fact that at the outset five of these enterprises were intended to be "hard", "widget-based" operations, while another two were intended to be a combination of "hard" and "soft", not one of the 14 enterprises had needed to obtain a license to exploit their business idea.

Figure 286 summarises the reasons given by these academic entrepreneurs for not having a license. (It is worth noting that some were unable to respond directly to this question, it was not unusual for the investigator to have to pose a series of supplementary questions in order to arrive at the answer.) As we can see, in five instances the IPR took the form of expertise/know-how which was not licensable. In three instances, the businesses had been founded before/after employment at Liverpool and in the latter instance, there is no evidence to suggest that the university might have had a claim. In another instance, the

fundamental idea was already in the public domain **Figure 286** also shows that in two instances it was asserted that the university did not own the IPR - and from a superficial grasp of the origins of the IPR, this would seem to be a fair assertion In the first instance the IPR derived from a "product" developed for the business via contract research done by the academic in the university in the conventional manner some considerable time prior to the company going into receivership and the academic acquiring it; the contract between the company and the university stated that the IPR belonged to the company, which was not unusual at **Liverpool** In the second instance, the university had tried to claim ownership of IPR which had been generated by two undergraduate students in the course of a final year project, since the terms and conditions of registration made no reference to IPR at the time - a gap which **Liverpool** has since plugged - the university was forced to give up its claim In a further instance, the academics concerned believed that the university did not own the IPR, since it had been generated at home in the course of extra-curricular activity which had nothing to do with their work, using equipment purchased privately expressly for the purpose Moreover, the IPR took the form of software, over which **Liverpool** had staked no claims at that point.

In another two instances, a superficial grasp of the origins of the IPR makes it difficult to judge whether or not the university could have staked a successful claim In the first instance the IPR derived from a prototype device designed by a privately-funded postgraduate student and assembled by departmental technicians on the basis of providing conventional technical support for that student However, members of the research group later transformed the device from a prototype to a marketable commodity in "their own" time but using - and paying for - departmental resources The resulting device was not protected by patent or registered design - and when the academics concerned obtained permission to market it by means of an independent spin-off company, the university did

not raise the question of ownership or a license. In the second instance, the IPR took the form of software which originated in one or more university departments as a research tool and which was transformed into a commercial product by an independent academic spin-off company. It was claimed that the question of ownership of the copyright has never been raised by any of the parties concerned, and if it were, the academic entrepreneur concerned feels that joint ownership would probably be the appropriate and fair solution, given the "downstream" development work which the company did.

In only one instance, then, would it appear that the university had an unequivocal right to the IPR in question - and in this instance, the academic entrepreneur deliberately withheld the information from the university. He believed that the university would get a better return if he gave the patentable discovery to a multinational company in exchange for continued research funding amounting to several £m over a number of years, he did not believe that the university would be wise enough to forego its conventional approach to exploitation of the IPR - viz. an up-front payment and royalties in exchange for a license or assignment of the rights - an approach which he felt would yield it very little. (This conviction is interesting in the light of a series of IPR-related anecdotes told by one of the other academic entrepreneurs (from a different Faculty), whose perception of the university's role in advising academics on the protection of IP they generated was uniformly negative. The first time he brought a discovery to the university's attention, the university patented it but assigned the rights to a company - which promptly suppressed the technology - either because the terms of the assignment did not preclude this or because the university paid no further attention to the IPR. The academic himself then infringed the agreement by showing the technology (without the protection of a confidentiality agreement) to another organisation which initially showed interest. Having examined the technology, the organisation returned the device, reporting that it had no

interest in it; the academic claims that the organisation in question now turns over approximately £200m p a , marketing a similar device based on this technology. The next time he brought a discovery to the university's attention, the university was not interested in patenting it. As a result, when next negotiating a research contract with a company, he let the company claim all the resulting IPR - which resulted in the company commercially exploiting a device and the university getting no return from this)

The one instance identified of IPR to which the university had an unequivocal right should not be taken to indicate that only one of the eight academic entrepreneurs from Liverpool has illicitly/illegally arranged for the exploitation of IP generated in the university. When the interviewees were asked whether the enterprise(s) they had founded/co-founded were still "hard"/"soft"/a combination of the two, it transpired that at least one had undergone a critical transformation over time This particular enterprise had changed from "soft" in its original incarnation, through a combination of "hard" and "soft" to virtually 100 per cent "hard" It was now taking instrumentation devised in the department for research purposes and paying a third party to redesign it into a marketable commodity, which it then marketed The enterprise in question paid the third party a royalty on sales, on the basis that the third party had substantially contributed to the resulting IPR and could claim joint ownership Curiously, despite the fact that the instrumentation was originally devised largely in pursuance of Research Council-funded projects, the founders of this particular enterprise did not feel that the university was entitled to ownership or royalties.

Despite the fact that none of these enterprises obtained a license from Liverpool, only seven of them made no return of any kind to the university. In two of the seven instances, university policy dictated that the academic entrepreneurs should have returned a share of their personal income or the company's annual profits to the university; however, both

were operating covertly and the question did not arise. In the other five instances, the enterprises were founded (and wound up) prior to the academic entrepreneur becoming a member of Liverpool's staff - or after the academic entrepreneur left and in the latter case, there is no evidence to suggest that the university had a claim.

At least one of the seven enterprises which made a return to the university calculated that return in terms of royalty payments, notwithstanding the absence of a license. In two instances, the return to the university took the form of dividends and, ultimately, the sale of equity. Where another two enterprises were concerned, the return took the form of a percentage of the overheads levied on contract research/consultancy income. In the remaining instances, the return took the form of a proportion of the academic entrepreneur's personal income from his company - or a proportion of the company's annual profits, depending on the arrangements agreed.

11.4.5 Demands of the Enterprise

The interviewees were asked a series of questions which, it was hoped, would give some indication of the scale and success of their businesses and the demands which those businesses placed upon them. At the outset, as **Figure 254** revealed, five of the enterprises were intended to be "hard", "widget-based" operations, while six were intended to be "soft", R&D/consultancy-based operations; the other two were intended to be a combination of the two, (the fourteenth was simply a shell company which could not be meaningfully characterised in this manner). The interviewees were first asked when the enterprises with which they were associated had started up, whether they personally were still in business, whether the enterprises they had founded/co-founded were still in business, and if so, whether the character of their enterprise(s) had changed substantially in the intervening years.

In order not to jeopardise the anonymity of the interviewees, the start-up dates of each enterprise have not been individually listed. However, Figure 256 shows the age range, the average age and the aggregate number of business years associated with the 14 enterprises. Clearly, at least one of these enterprises is only one year old, but the age range of 1-17 years, the average age of 6.36 years and 89 aggregate business years should indicate that most of these businesses had survived beyond the first year, in which it is estimated a significant percentage of new businesses fail. As Figure 287 shows, five (62%) of the eight confirmed that they were still in business, though not necessarily in the context of the first - or, in one instance, even the second - business they had started. Of the three (38%) who were no longer in business, one had never been actively involved, even at the outset, another had let the business wither, the third had sold his share of the business and left it. Figure 287 also shows that three (21%) of the fourteen businesses founded by these academics were no longer in operation in 1990. (Only one might be described as a failure, however, in the other two instances the companies had served their short-term purpose and the academic concerned had moved onto his next entrepreneurial venture.) Figure 287 reveals, too, that of the eleven enterprises which were still in business, one was operating in a different legal framework and a second had been taken over by another company and the name changed. Finally, Figure 287 shows that all but two of the fourteen enterprises had maintained their original character. Of the two which had changed their character, one had transformed itself from a "soft" company into a "hard", "widget-based" company, while the other had transformed itself from a "soft" company into one which was a combination of "hard" and "soft".

The interviewees were then asked whether, at the outset, they had made long-term projections about the future of their enterprise(s). As we can see from Figure 258, where

at least three of the thirteen enterprises under consideration were concerned, the interviewees had made no long-term projection at all. In one instance, the interviewee observed that the business had been set up purely for fun to exploit a demand which was expected to wane fairly quickly (the market consisted purely of would-be UFO-spotters!). In another, the interviewee commented that the business had just "ticked along at its own pace"; by chance the combination of market demand and this non-directive approach had led to the business "growing like Topsy". Figure 259 reveals the projections made with regard to eight of the thirteen enterprises under consideration. As we can see, four have been categorised as ambitious, "infinite" projections, while another two have been categorised as finite but growth-oriented projections, the last two have been categorised as finite and limiting projections. The co-founder of one of these two observed that he had limited aspirations because he had witnessed the disasters which had befallen one or two academics who had great expectations of businesses they had founded to exploit the same broad technological advances.

Attempts were made to gauge the actual growth of these eight businesses in terms of the turnover attained and the number of employees. This could not be done in an entirely satisfactory manner, since it was impossible to obtain strictly comparable data. Ideally, the investigator would have wished to establish for each enterprise the turnover for the financial year ending 1990 and the number of employees, and relate this information to the age of the business. As we have seen, however, some enterprises were no longer in business in 1990; where some were concerned, interviewees had parted company with the enterprise some time before 1990 and did not have up-to-date information. It was felt, though, that some impression of the actual growth of most of these enterprises could be gauged by dint of establishing the turnover and the number of employees in 1990 or the last year the enterprise was still in operation or the last year in which the interviewee was

associated with the enterprise. Figure 260 indicates the range of annual turnover achieved by 12 of the 14 businesses, the average turnover and the aggregate turnover for all 12. With an annual turnover ranging from £12,000 to £1,200,000 and an average turnover of £405,166, it should be clear that some of these were being run as fairly serious businesses, not as hobbies by dilettantes. Figure 261 reveals the range of employees, the average number of employees and the aggregate number of employees in the 14 businesses being investigated in this study. Again, with employee numbers ranging up to 33 and an average of 8 employees, it is clear that many of these were serious businesses, rather than life-style businesses or hobbies.

The interviewees were next asked whether they had gone into business as sole traders or whether they had had partners at the outset - and if so, how many, and who they had been. As Figure 262 shows, none had attempted to go into business alone. In five instances, the interviewee had gone into business with one partner, in two instances, he had gone into business with two partners, in another five instances, the interviewee had gone into business with three partners. Figure 263 reveals how, in relation to the enterprises under consideration, the interviewees had identified their business partners. It is evident that the vast majority were either fellow academics or family members - either wives or, in one instance, a son. Minority sources ranged from the university to private sector individuals or, in one instance, an institutional partner from the private sector. Out of the 24 business partners, only four could be described as "professional", there is no evidence that any of the other business partners had *bona fide* business skills or experience. (It is worth noting that by 1990 only two of the 12 enterprises under consideration in this section of the analysis had taken on board additional partners - one as a result of the need for venture capital to fund expansion, the other as a result of the university spinning it off as a separate company and, eventually, selling its equity stake in

the separate company)

Given the lack of business experience of most of these would-be academic entrepreneurs and most of their business partners, the interviewees were asked which role(s) they had assumed at the outset in the enterprises which they had founded/co-founded, which role(s) had been assumed by their business partners and whether they had taken on employees with the requisite business skills. It is clear from Figure 288 that at the outset only three out of the 13 enterprises detailed had taken on employees with managerial responsibilities. Ironically, two of the three already had "professional" business partners. So, initially, at least, five of the eight would-be academic entrepreneurs had shouldered the burden of both technical development and business development with neither "professional" partners nor employees with managerial responsibilities. A sixth had the assistance of a "professional" partner - but only briefly; a seventh had relied completely on employees (albeit inexperienced employees) with managerial responsibilities. (This situation did not change much with the passing of years; eventually, just one of the 13 enterprises detailed took on a paid managing director, metamorphosing his own role into that of chairman.)

Finally, given the burden apparently shouldered by most of these academic entrepreneurs, they were asked how much time they had devoted to the business on average - per week/month/year - and whether they had devoted this time during evenings and/or weekends and/or during the week (*ie.* Monday to Friday, 9-5). Figure 265 reveals the difficulty inherent in trying to establish an objective, quantifiable measure of how much time each devoted to their entrepreneurial activities in an organisation which had no use for time-sheets (*ie.* the university). The result is at best impressionistic

11.4.6 Interaction with the Department

It was felt that investigation of the interaction of these academic entrepreneurs with their department might be a more productive line of analysis. The interviewees were first asked to answer as honestly as they could and say whether they thought their entrepreneurial activities had ever impacted on their academic commitments, and if so, whether they perceived this to be a positive or a negative impact. As we can see from Figure 266, two felt that there had been a negative impact, while six felt that their business activities had impacted positively on their academic commitments. Figure 289 presents the views of six of the eight on the particular ways in which their business activities had impacted on their academic commitments, be it positively or negatively. As we can see, attempts to group and characterise yielded six fairly distinct categories. These particular academic entrepreneurs saw the impact of their business activities on their academic commitments as

- * deleterious to teaching;
- * beneficial to teaching,
- * beneficial to one's general *modus operandi*,
- * publicity-generating,
- * motivating,
- nd/or * beneficial to research

As we can see, both those who admitted to a negative impact cited the affect of their business activities on their teaching. In contrast, taken as a group the six claimed a wide range of beneficial impacts. Judging by the number of "mentions", perception of benefit to their general *modus operandi* was the most common, whereas perceived benefit to teaching, publicity and motivation were all one-offs.

The interviewees were then asked whether they had ever asked any favours *vis-a-vis* their academic commitments. Figure 268 indicates whether they recollected having asked any favours (formally or informally) in order to accommodate the demands of their businesses. As we can see, only three admitted that they had sought any kind of favours on this account. One had informally asked students and colleagues to accept the rescheduling of lectures, seminars *etc*; this had not entailed asking a favour of his HoD, since he himself was HoD for much of the time. Two had formally asked for major changes to accommodate their business interests - a sabbatical, followed by early retirement in one instance, partial secondment to the enterprise in the other. In both instances, the favours were granted. (It may be worth noting that the would-be academic entrepreneur seeking a sabbatical followed by early retirement also intended to devote his free time to a major research contract and this may have influenced his HoD)

The interviewees were next asked how their colleagues had reacted to their business activities. As Figure 290 reveals, between them the eight academic entrepreneurs apparently elicited a wide range of reactions. Efforts to group and characterise these reactions yielded the following seven categories:

- * jealousy,
- * resentment,
- * snide comments,
- * concern,
- * inscrutability,
- * neutrality,
- and/or * support.

Clearly, this exercise yielded a sizeable number of categories. However, it was felt that there were subtle but important differences between, say, jealousy, resentment, snide comments and concern, and that simply grouping them into fewer, more embracing categories might constitute the kind of reductionism which qualitative research usually strives to avoid. Moreover, there is nothing to prevent us from grouping these categories into a variety of different, perhaps partially overlapping "super-categories". So, for example, we could group them into

- * negative (jealousy, resentment, snide comments, concern),
 - * neutral (inscrutability, neutrality),
- and
- * positive (support)

From the number of categories and the number of "mentions", we can easily deduce that these eight academic entrepreneurs *perceived* their colleagues' reactions to be predominantly negative. Interestingly, one of the eight academic entrepreneurs had occupied the position of HoD when he started his business. The reactions of his particular colleagues have been categorised as increasing resentment, it would appear, then that HoDs are not necessarily immune from negative reactions on the part of their staff, even if they have been appointed HoD for life, as this one had. Asked how their HoD had reacted to their business activities, the other seven interviewees gave very divergent answers, as Figure 270 shows. However, the majority had apparently been either supportive or neutral. The HoD who was reported to be antipathetic adopted this attitude in response to the academic entrepreneur's original aspirations, namely a commercial arm of the department; he did not react antipathetically to the independent academic spin-off companies subsequently founded by the academic in question - but then he did not know about all of them. The HoD whose reaction was changeable veered from extreme antipathy (on the grounds that the enterprise would not make money but would nonetheless

impinge on the academics' time) to a situation which he inherited, to being morally supportive (on the grounds that the enterprise did make money, that it did not cause problems and that it allowed the department to overcome institutional obstacles such as the employment of research staff on idiosyncratic contracts).

The eight academic entrepreneurs were next asked whether they had researched or even considered Liverpool's promotion criteria prior to setting up in business, whether they had been promoted since starting their first business and whether they were worried about their promotion prospects (In the context of this investigation, promotion was interpreted in the widest sense, ranging from promotion from Research Fellow to Lecturer to promotion from Professor to HoD/Dean/Pro-Vice-Chancellor *etc*) As we can see from Figure 271, only one of the eight had even considered the university's promotion criteria prior to setting up in business - but he had not sought to obtain a copy of the criteria because he felt he knew them well enough already Interestingly, one of the seven who had not considered/researched the promotion criteria remarked that he had no great ambitions in relation to the university's conventional career structure. This was echoed by another, who observed that he had not been bent on remaining in the university, anyway. Yet another remarked (semi-jokingly) that he was in a dead-end job already, since he had no interest in progressing beyond his present level. A fourth commented that he had already figured out that he should take the precaution of not putting his entrepreneurial activities on his CV. Figure 271 reveals that four out of the seven academic entrepreneurs who remained members of the academic staff had, in fact, been promoted after starting their first business However, Figure 271 also shows that one of the three who had not been promoted since starting his first business had begun to worry about his promotion prospects, observing that he would not be surprised if his business activities had a negative impact on his promotion prospects, nonetheless, he took the chance of detailing them on

his curriculum vitae

The eight academic entrepreneurs were then asked whether, at the outset, they had contemplated leaving the university in order to devote time and energy to their business(es) without having to worry about the attitude of their colleagues and their HoD - or their promotion prospects. As Figure 272 reveals, where four enterprises were concerned, the two interviewees associated with them had contemplated leaving at the outset, we see from Figure 273 that only one interviewee actually left, however. The remaining seven were then asked whether they had later contemplated leaving, some time after starting their businesses. As Figure 274 indicates, where six enterprises were concerned, the interviewees associated with them contemplated later contemplated leaving - but Figure 275 shows us that only one actually left in due course.

The two academic entrepreneurs who left the university were asked what had made them decide to leave. Figure 291 details the reasons they gave, and shows that efforts to group and characterise those reasons were not successful in this instance, each reason seemed to constitute its own, separate category. These particular academic entrepreneurs left

- * because of the demands of the business,
- * because of promotion prospects,
- and/or * due to rejection of change

Chapter 4 introduced the concept of entrepreneurship being a response to one of two types of stimulus. In this scenario, entrepreneurs are either "pushed" into entrepreneurship by events happening in or characteristics of the organisation in which they were previously located, or they are "pulled" towards entrepreneurship by attributes of the activity of entrepreneurship itself, or the particular manifestation of the entrepreneurial venture in

question, or perhaps by events or opportunities to which the entrepreneurial venture might respond - such as capitalising on a particular market opportunity. If we group the categories identified in terms of these two "super-categories", we obtain the following result.

- * push (promotion prospects, rejection of change),
- * pull (demands of the business)

One of these academic entrepreneurs was clearly "pushed" into forsaking the university for his business, while the other was "pulled" towards satisfying the demands of his various businesses in preference to the demands of the university.

Finally, those academic entrepreneurs who had stayed in the university were asked why they had stayed, instead of leaving (partially or wholly) to devote more time to their business interests. Figure 292 details their reasons and shows that efforts to group and characterise those reasons were not successful in this instance, each reason seemed to constitute its own, separate category. Four of the six academic entrepreneurs stayed in the university because of.

- * career aspirations;
 - * perceptions of risk;
 - * insufficient profit levels;
- or
- * lack of involvement in the business

"Super-categorising" these in terms of "push" versus "pull" is not quite appropriate, given that their starting point was the university, not their business. However, we could "super-categorise" them in terms of the "pull" of the university versus "deterrent" aspects of the businesses.

- * pull (career aspirations),
- * deterrent (risk, profit levels)

Lack of involvement is not so straightforward to "super-categorise" in this way, but it could be argued that this particular academic entrepreneur's lack of involvement in the business he had been keen to establish indicated that he had other priorities - namely, conventional, academic priorities. If we are prepared to "super-categorise" lack of involvement as a "pull" factor, following this logic, then it is evident that two of these four academic entrepreneurs were "pulled" into staying by attributes of academic life, while the other two were "deterred" from cutting loose from the university to pursue their business interests, despite having contemplated the idea.

Case Analysis:
Strathclyde University

11.5 Strathclyde University

11.5.1 Origins

The six would-be academic entrepreneurs from Strathclyde were asked what idea(s) they had hit upon which were being/had been exploited via the fourteen enterprises with which, as a group, they were associated - and how they had got their idea(s) As Figure 293 shows, the source(s) of their idea(s) were reasonably diverse and it was felt that they usefully could be grouped into and characterised by six categories. These particular academic entrepreneurs got their ideas from:

- * informal collaboration with a colleague,
- * an academic tool;
- * grant-aided research,
- * contract research/consultancy,
- * supposed demand;
- and/or * demand

Clearly, this could be reduced to just four if grant-aided research were grouped together with contract research/consultancy, and supposed demand were grouped together with demand. However, it was felt that this might be practising reductionism for the sake of it. In view of the commonly levelled criticism that academics tend to be preoccupied more by technology "push" than by market "pull", as already mentioned, it would have been interesting to categorise the initial idea for their enterprises in this way Unfortunately, this question was not explicitly posed, which makes this difficult However, the source of some ideas (those categorised as demand or supposed demand) strongly suggests that market "pull" was involved - or at least the *perception* of market "pull". Those who cited sources categorised as contract research/consultancy were doubtless aware of a degree of market interest, too. It would appear, therefore, that few ideas resulted purely from

technology "push".

All six interviewees volunteered information on their motives in pursuing their entrepreneurial idea(s). As Figure 294 indicates, upon examining the reasons they gave, it was felt that eight distinct categories of motive emerged. These particular academic entrepreneurs were motivated by:

- * the belief that entrepreneurship leads to more effective teaching;
 - * an applied outlook;
 - * no alternative exploitation mechanism available;
 - * BTG enthusiasm,
 - * financial expediency;
 - * pursuit of excellence;
 - * income generation;
- and/or *
- * the value of the enterprise as a segregation mechanism

11.5.2 Business Experience, Role Models, Networks

Efforts were made to establish whether these interviewees from Strathclyde had any business experience prior to founding/co-founding their first enterprise, especially small business experience. As Figure 241 shows, none of the six had any business experience as such. Four had worked in industry in a scientific/technical capacity - but only three had been promoted to the point where it could be argued that their seniority and their remit (often product development) gave them some insights into business - albeit large businesses.

The interviewees were then asked whether any of their close family had owned or run a small or medium-sized business. As we can see from Figure 242, three of the six

interviewees came from families which ran their own businesses - and a further two had relatives (in one instance cousins, in another grandparents and uncles) who ran their own business. Without exception these were small businesses (<50 employees) - and all were trades-oriented rather than professional.

The interviewees were next asked whether, prior to setting up their first enterprise, they had known/known of any other *academics* who had set up in business - either at their own university or any other. As Figure 243 reveals, four of the six reported that they had known/known of other entrepreneurial academics. One had known two members of his own department who had each founded/co-founded a company, one had known of a fellow member of the same university who had done so, one had known an entrepreneurial academic in nearby Glasgow University. Two had known of academic entrepreneurs from other UK universities, and another two had come into contact with academic entrepreneurs in US universities. One named a number of well-known companies which he believed to have been founded by academics.

Of the four interviewees who had known/known of other academic entrepreneurs, only one had made use of what was a potentially useful network, as Figure 244 reveals. He felt that the discussion had given him insights into why their businesses did or did not work, but had not helped him a great deal with the business he was planning. Two commented that they had not approached other academic entrepreneurs in the university because they had not known them personally and the university had not taken the trouble to introduce them. The last had been curious about the relationship between American academics with their own enterprises and their university. However, he had felt that they might be running their businesses illicitly and therefore might not welcome questions.

11.5.3 Interaction with the University

The six interviewees were asked whether, when first seriously considering their business idea, they had known what their university's policy was *vis-a-vis* academics starting up business ventures. As we can see from **Figure 245**, four reported that, on the first occasion, at least, they had had no knowledge whatsoever when the thought first struck them - indeed, one of them was sure that the university did not have a policy at the time, that it was making up the rules "*on the hoof*". Another felt that even if the university had had a policy, it would not have been equipped to deal with the particular circumstances in which he found himself. A third, wishing to clarify the situation at the earliest possible opportunity, had raised the subject at his interview panel. However, the remaining two interviewees - both of whom were contemplating their entrepreneurial ventures at a somewhat later date than most of the others - knew through the grapevine that, in principle at least, **Strathclyde** was supportive of academics' efforts to be entrepreneurial.

None of the six would-be academic entrepreneurs tried to operate covertly. **Figure 295** shows which member of the university each initially approached with a view to discussing his plans - and to whom, if anyone, each subsequently spoke; it shows this in relation to the first/only entrepreneurial venture founded by the academics in question, and also in relation to subsequent ventures, where appropriate, finally, it shows the interviewee's status at the time the approach was made. **Figure 296** shows each would-be academic entrepreneur's objective(s) in discussing their plans with the representative(s) of the university indicated in **Figure 295**. **Figure 297** details the six would-be academic entrepreneurs' expectation(s) of the outcome of the discussions, while **Figure 298** details the university's actual response to each request.

Despite the absence of an explicit policy at Strathclyde, it is clear from Figure 295 that all the would-be academic entrepreneurs but one somehow arrived at the idea that in order to progress their idea, they should speak directly to the Principal and/or the ILO, they do not appear to have relied on intermediaries or to have been sidetracked in any way. The one exception dates back to a period before the current Principal or current ILO were in post - and although it took this particular would-be academic entrepreneur some time to arrive at the Bursar's door, he nonetheless started out in the right section of the university for that period

Interestingly, Figure 296 shows us that five of the six had very specific objectives, only one went seeking advice on the best way forward - and by the time he made his next approach, he, too, had a specific objective in mind. We can see from Figure 297 shows us that these would-be academic entrepreneurs from Strathclyde had uniformly positive expectations in relation to the outcome of discussions - and Figure 298 suggests that, with one or two exceptions, the university's actual response matched their expectations, irrespective of nature of their particular objective(s) Only one would-be academic entrepreneur got a less than positive response initially - and when he demonstrated, by generating interest among external investors, that the university's initial assessment might be wrong, the university changed its mind Another got a positive response to his objective concerning company start-up, but a negative response in relation to negotiating a license from the university - negative from his perspective, that is to say - because he was not prepared to agree to a license which stipulated a higher percentage royalty to the university than he felt was reasonable When considering these findings, it must be remembered that these six in no way constitute a representative sample We should not conclude that Strathclyde will almost invariably respond positively to the objectives of would-be academic entrepreneurs - or that entrepreneurial academics will necessarily find

the university's license terms unacceptable, *etc etc*.

The six interviewees were asked whether the university had played any role in helping them start up their business venture. In this context, help was defined as making available (on whatever basis - *eg. gratis* or for some form of payment) equipment, instrumentation, accommodation, technical or secretarial support staff, communications, in-house professional advice, referral to external sources of professional advice, funding of any sort or infrastructure assistance (*eg. practical* assistance with things like company registration, billing, debt collection, tax, VAT, administration, publicity *etc*) or any other form of assistance the interviewees cared to name. As we can see from Figure 250, where 13 of the 14 enterprises founded/co-founded by these interviewees were concerned, the interviewees recollected at once that the university had played a role in helping them set up their business venture. This figure did not increase to 14 out of 14 upon further questioning, suggesting that academics at Strathclyde were well aware of the help which the university had given.

Figure 299 details the types of assistance provided by the university, both initially, in the lead-up to and the aftermath of start-up, and later on, once the business was established. As we can see, no single type of assistance was given to all thirteen enterprises - but between them the thirteen made use of every type of assistance listed, initially at least. The most common form of assistance initially was in-house professional advice, while use of communications, equipment and instrumentation, accommodation and assistance with funding were all fairly common, too. Assistance with funding took a number of forms, ranging from the underwriting of business plans to money for market research, from introductions to venture capitalists and the soliciting of investment from other funds to putting up the capital for equity stakes ranging from £10,000 to over £200,000, from first

-round funding to second-round funding. It is evident that assistance in the form of technicians was the least common form of assistance received - indeed, once these businesses were established, there was no call at all for this kind of assistance, apparently. Finally, Figure 299 shows us that with the passing of time, as a group these businesses depended somewhat less on the university for their particular type(s) of assistance. However, it is interesting to note that some did not make themselves completely independent of the university. Later, although dependency on the university for such assistance diminished somewhat, use of equipment and instrumentation and assistance with funding remained the most common.

The six interviewees were asked whether they had been satisfied with the role (if any) which the university had played in helping them to set up their business(es). Figure 252 indicates their satisfaction levels in relation to each enterprise with which the six were associated, excepting three businesses which were still in the process of being set up. It seems that satisfaction levels at Strathclyde were remarkably high, with 82 per cent expressing complete satisfaction. In only one instance does this satisfaction derive from the fact that the university played no role at all in helping them set up the business. Moreover, this particular entrepreneur had no qualms about the university playing a role; he had simply derived satisfaction from the fact that he was driving the project to fruition himself. Despite this high incidence of complete satisfaction, it is evident that in two instances the entrepreneurs were definitely not satisfied.

Those who expressed anything but complete satisfaction were asked why they had been dissatisfied to a greater or lesser degree. Figure 300 details their responses. Attempts to group and characterise the reasons for this dissatisfaction yielded just one category. The two - both of whom were definitely dissatisfied - complained that Strathclyde had tried

to impose

* onerous terms

In one instance, the onerous terms were perceived to apply to an independent academic spin-off company; in the other, they were perceived to apply not to the joint venture with the university which was being set up, but to the department whose commercial arm was being spun-off into a company

11.5.4 Intellectual Property Rights

The six interviewees were asked whether the enterprise(s) they had founded/co-founded were intended to be "hard" or "soft" - or a combination of the two. As Figure 254 shows, at the outset, five of the enterprises were intended to be "hard", "widget-based" operations, while another six were intended to be "soft", R&D/consultancy-based operations, the remaining three were intended to be a combination of "hard" and "soft". Having established this, the interviewees were asked whether they had needed to obtain a license from the university - or, indeed, any other organisation - to allow them to exploit the IP in question.

Despite the fact that at the outset five of these enterprises were intended to be "hard", "widget-based" operations, while another three were intended to be a combination of "hard" and "soft", only six had sought to obtain a license - from the university or whoever owned the IPR their business was trying to exploit. Figure 301 summarises the reasons given by the other academic entrepreneurs for not having a license. As we can see, in five instances the IPR took the form of expertise/know-how, which was not licensable. In another two, the plan was for the IPR to be exploited by a departmental commercial arm, in one instance, this actually happened and the question of a license never arose, in the other, it was decided to exploit the IPR via a company instead - and

the company sought a license. In the remaining instance, the only licensable products were licensed in from third parties.

The academics whose enterprises had been obliged to obtain a license for the IPR they planned to exploit were asked whether they had found the negotiations difficult, and whether they had been helped by anyone. Three of the enterprises had been obliged to seek a license from the university, rather than a third party. In one instance, it had proved impossible for the would-be academic entrepreneur and the university to agree on the terms of the license - with the result that the company was shelved. In another, the would-be academic entrepreneur had simply accepted the terms which the IL office proposed. In the third, the IL office had assumed responsibility for negotiating the license on behalf of the company, since it was to be a joint venture between the academic, the university and third parties, as the interviewee himself commented, this led to a curious situation in which the university was effectively negotiating with itself. Another two enterprises had been obliged to seek a license from a third party. In both instances, the would-be academic entrepreneurs found themselves negotiating unaided with the BTG. It is not clear why these particular would-be academic entrepreneurs got no assistance from the IL office, since in both instances, the university had an interest in the companies which had been founded to exploit the IP, this is, perhaps, an example of academics being allowed to assume responsibility themselves. Both interviewees perceived the BTG to have been extremely aggressive; one claimed that BTG negotiators had made veiled threats about what would happen to him if he did not agree to their terms. This particular interviewee eventually paid for specialist legal assistance and the negotiations were concluded on his behalf by a lawyer. Despite professional assistance, it later transpired that the company had not been granted an exclusive license; the BTG reserved its right to license rival companies if it chose to. In the other instance it was reported that the would-be academic

entrepreneur and the BTG had reached an impasse which was only overcome when an experienced member of Strathclyde's Court stepped in as a facilitator. Again, despite assistance, the BTG managed to negotiate terms which gave it virtually unlimited rights to "downstream" IPR developments undertaken by the company. With regard to the third enterprise, since the academics concerned were leading a consortium attempting to acquire a division of an existing company, it was understood that the company owned the IPR it was exploiting, in the event, it transpired that some of the IPR was owned by third parties and the partners were obliged to become embroiled in intricate, difficult negotiations.

Where these six enterprises were concerned, the return to the university - be it in royalties, dividends or, ultimately, sale of equity, was laid down in detail. Where most of the other enterprises were concerned, the return to the university took the form of a percentage of the overheads levied on contract research income.

11.5.5 Demands of the Business

The interviewees were asked a series of questions which, it was hoped, would give some indication of the scale of their businesses and the demands which their businesses placed upon them. At the outset, as Figure 254 revealed, five of the enterprises were intended to be "hard", "widget-based" operations, while another six were intended to be "soft", R&D/consultancy-based operations; the remaining three were intended to be a combination of "hard" and "soft". The interviewees were asked when the enterprises with which they were associated had started up, whether they personally were still in business, whether the enterprise(s) they had founded were still in business, and if so, whether the character of their enterprise(s) had changed substantially in the intervening years.

In order not to jeopardise the anonymity of the interviewees, the start-up dates of each enterprise have not been individually listed. However, Figure 256 shows the age range, the average age and the aggregate number of business years achieved by the 14 enterprises. It is worth noting that half of these enterprises were only one year old - or less in some cases. This explains the relatively low average age of 4.5 years and 63 aggregate business years. Nonetheless, these figures should indicate that several of these businesses had survived beyond the first year, in which a significant percentage of new businesses fail. As Figure 302 shows, four (67%) of the six academic entrepreneurs confirmed that they were still in business - though not necessarily in the context of the first business they had started. One of the two (33%) who were no longer in business at all had sold his share of the business and left it, while the other had no interest in the business in its new legal framework, preferring to concentrate on his academic commitments instead - particularly his research interests. Figure 302 also shows that only three (21%) of the fourteen businesses founded by these academics were no longer in operation in 1990. (This is probably an over-optimistic figure, because although two of the 14 businesses had been conceived and a considerable amount of effort had been put into them, technically at least, they were not yet incarnate at the time the interviews were conducted.) Two of the three businesses no longer in operation could be described as a failure, though the first was not necessarily a terminal failure. This company had never really started operating in the first place, due to the would-be academic entrepreneur's and the university's inability to agree the terms of the license, the company was still "*on the shelf*", however, and could be activated, should agreement be reached. Where the other was concerned, Strathclyde had exercised its right to withdraw the company's license in order to salvage the IPR when it became clear that the company had been seriously under-capitalised from the outset. The third enterprise ceased to operate because it was so

successful, it became appropriate to conduct business within a different legal framework. Finally, Figure 302 shows that all but one of the fourteen enterprises had maintained their original character, one had been obliged to change its character, however, transforming itself from a company which was a combination of "hard" and "soft" into a "soft" company.

The interviewees were then asked whether, at the outset, they had made long-term projections about the future of their enterprise(s). As we can see from Figure 258, where at least ten of the fourteen enterprises were concerned, the interviewees had made a long-term projection, it is not clear whether the remaining four did so or not. Figure 259 reveals the projections made with regard to these ten enterprises. As we can see, eight have been categorised as ambitious, "infinite" projections, while the other two have been categorised as finite but growth-oriented projections.

Attempts were made to gauge the actual growth of these eight businesses in terms of the turnover attained and the number of employees. This could not be done in an entirely satisfactory manner, since it was impossible to obtain strictly comparable data. Ideally, the investigator would have wished to establish for each enterprise the turnover for the financial year ending 1990 and the number of employees, and relate this information to the age of the business. As we have seen, however, some enterprises were no longer in business in 1990, where some were concerned, interviewees had parted company with the enterprise some time before 1990 and did not have up-to-date information. It was felt, though, that some impression of the actual growth of most of these enterprises could be gauged by dint of establishing the turnover and the number of employees in 1990 or the last year the enterprise was still in operation or the last year in which the interviewee was associated with the enterprise. Figure 260 indicates the range of annual turnover achieved

by seven of the 14 businesses, the average turnover and the aggregate turnover for all seven. With an annual turnover ranging from £50,000 to £500,000 and an average turnover of £248,571, it should be clear that some of these are being run as fairly serious businesses, not as hobbies by dilettantes. Figure 261 reveals the range of employees, the average number of employees and the aggregate number of employees in ten of the 14 businesses being investigated in this study. Again, with employee numbers ranging from 0 to 25 and an average of 7 employees, it is clear that at least some of these were being run as serious businesses, rather than life-style businesses or hobbies.

The interviewees were next asked whether they had gone into business as sole traders or whether they had had partners at the outset - and if so, how many, and who they had been. As Figure 262 shows, none had attempted to go into business alone, the number of partners over and above the interviewee ranged from one to five. However, in nearly half the enterprises under consideration, the interviewees had gone into business with two partners. Figure 263 reveals how, in relation to the enterprises under consideration, the interviewees had identified their business partners. It is evident that nearly half were academics, while most of the others comprised either the university or public sector institutions. Private sector institutions represented a minority source, relatively speaking. Out of the 21 business partners under consideration, only eight - eight of the ten fellow academics - could not be described as "professional". Two of the academic partners had acquired considerable business experience over the years and the partners drawn from the public sector, the private sector and the university all had *bona fide* business skills and/or experience. (It is worth noting that by 1990 none of the enterprises under consideration in this section of the analysis had taken on board additional partners - indeed, one had shed one of its original partners.)

The interviewees were asked which role(s) they had assumed at the outset in the enterprises which they had founded/co-founded, which role(s) had been assumed by their business partners and whether they had taken on employees with managerial responsibilities. It is clear from Figure 303 that at the outset only two out of the 11 enterprises detailed had taken on employees with managerial responsibilities - and both of these already benefitted from "professional" business partners. Indeed, only six of the 11 enterprises under consideration here did not have the benefit of "professional" business partners. However, this meant that in the context of their first enterprise at least five of the six would-be academic entrepreneurs had intended to shoulder the burden of both technical development and business development with neither "professional" partners nor employees with managerial responsibilities. (Nor did this situation change with the passing of years; none of these enterprises acquired "professional" assistance by one route or the other. However, three of the five went on to found subsequent enterprises - and it is noticeable that all three located "professional" business partners second time around.)

Finally, given the burden apparently shouldered by some of these academic entrepreneurs, they were asked how much time they had devoted to their business(es) on average - per week/month/year - and whether they had devoted this time during evenings and/or weekends and/or during the week (*ie* Monday to Friday, 9-5). Figure 265 reveals the difficulty inherent in trying to establish an objective, quantifiable measure of how much time each devoted to their entrepreneurial activities in an organisation which had no use for time-sheets (*ie* the university). The result is at best impressionistic.

11.5.6 Interaction with the Department

It was felt that investigation of the interaction of these academic entrepreneurs with their department might be a more productive line of analysis. The interviewees were first asked

to answer as honestly as they could and say whether they thought their entrepreneurial activities had ever impacted on their academic commitments, and if so, whether they perceived this to be a positive or a negative impact. As we can see from Figure 266, three felt that there had been a negative impact, while all six felt that their business activities had impacted positively on their academic commitments. Figure 304 presents the views of all six on the particular ways in which their business activities impacted on their academic commitments, be it positively or negatively. Attempts to group and characterise them yielded four distinct categories. These particular academic entrepreneurs saw the impact of their business activities on their academic commitments as

- * deleterious to publication rates,
- * beneficial to teaching ;
- * beneficial to research,
- and/or * beneficial to learning

As we can see, all three who admitted to a negative impact cited the affect of their business activities on their publication rate, whereas, judging by the number of "mentions", most often they perceived a beneficial impact on teaching, then research, then learning.

The interviewees were then asked whether they had ever asked any favours *vis-à-vis* their academic commitments. Figure 268 indicates whether the interviewees recollected having asked any favours (formal or informal) in order to accommodate the demands of their business. As we can see, only two admitted to having asked any favours - and in both instances they were formal favours, entailing official secondment to the business - one for two and a half days per week, the other for three and a half days per week.

Next, the interviewees were asked how their colleagues reacted to their business activities. As Figure 305 reveals, between them the six academic entrepreneurs apparently elicited a wide range of reactions. Efforts to group and characterise those reactions yielded the following four categories:

- * resentment,
- * jealousy;
- * snide comments,
- * qualified acceptance

Clearly, we could group them into fewer, more embracing categories. However, it was felt that there were subtle but important differences between, say, resentment, jealousy and snide comments and simply grouping them into fewer, more embracing categories might constitute the kind of reductionism which qualitative research usually strives to avoid. Moreover, there is nothing to prevent us from grouping these categories into "super-categories". So, for example, we could group them into:

- * negative (jealousy, resentment, snide comments),
- and
- * semi-positive (qualified acceptance)

From the number of categories and the number of "mentions", we can easily deduce that these six academic entrepreneurs *perceived* their colleagues' reactions to be predominantly negative. Interestingly, one of the six academic entrepreneurs occupied the position of HoD when he was setting up the enterprise - though he later gave up this position. The reactions of his particular colleagues have been categorised as sporadic jealousy at first, escalating to widespread resentment once devolved budgets were introduced, it seems likely, though, that their jealousy and resentment were occasioned more by his research-only contract and the burden he placed on the department than by his business activities *per se*. Asked how their HoD had reacted to their business activities, the interviewees

gave very divergent answers, as Figure 270 shows. However, the majority were apparently either supportive or neutral. The HoD who was reported to be slightly antipathetic was reacting to a situation which he had inherited as a *fait accompli*, he objected to the fact that the academic concerned appeared to operate on the basis of authorisation given centrally rather than by the department itself. The HoD whose reaction was changeable veered from supportive to antipathetic due to concern about the size of the enterprise (which was effectively a departmental commercial arm), the fact that it employed nearly as many non-UGC funded staff as the department had UGC-funded staff, its space requirements and the fact that the income it generated seemed to be ploughed straight back into the business, without benefitting the department directly.

The six academic entrepreneurs were next asked whether they had researched or even considered Strathclyde's promotion criteria prior to setting up in business, whether they had been promoted since starting their first business and whether they were worried about their promotion prospects. (In the context of this investigation, promotion was interpreted in the widest sense, ranging from promotion from Research Fellow to Lecturer to promotion from Professor to HoD/Dean/Pro-Vice-Chancellor *etc*.) As we can see from Figure 271, only one of the six had even considered the university's promotion criteria prior to setting up in business. Interestingly, two of the five who had not researched or even considered the promotion criteria explained that they had had no interest whatever in becoming Dean/Deputy Principal/Principal. Figure 271 also reveals that only one of the six had been promoted after starting his first business; however, it is worth noting that several of five who had not been promoted after starting their first business had founded the business in question a fairly short time before being interviewed. Finally, Figure 271 shows us that, of the four who were still a member of the academic staff, none had begun to worry about his promotion prospects, despite the lack of promotion. As we have seen,

two had no interest in progressing further up the conventional academic ladder, in any case. Another had concluded at the outset that he would not be promoted if he pursued his entrepreneurial interests, but had gone ahead and pursued them anyway, since the university had seemed to him to be the best context from which to pursue them. The fourth recollected that although it had not struck him at first, he had later recognised that pursuit of his entrepreneurial interests did not seem to be compatible with progressing further up the conventional academic career ladder, even though the university had supported - indeed, encouraged - his activities both morally and financially, and at a certain point, therefore, he had consciously sacrificed his promotion prospects in order to devote his energies to the business. This particular interviewee had later relinquished his share of the business (without profit) and admitted to sadness that he was nonetheless excluded from influential university committees and the chance to become Deputy Principal

The six academic entrepreneurs were then asked whether, at the outset, they had contemplated leaving the university in order to devote time and energy to their business(es) without having to worry about the attitude of their colleagues and their HoD - or their promotion prospects. As Figure 272 reveals, where one enterprise was concerned, the interviewee associated with it had contemplated leaving at the outset, while the interviewee associated with another five enterprises had contemplated having a foot in both camps, officially spending half his time in the university, half in the businesses. We see from Figure 273 that two interviewees actually left, rather than one, however. In fact, the one who had contemplated leaving ended up with a foot in both camps, officially spending half his time in the university, half in the business, whereas the interviewee who had contemplated having a foot in both camps was still employed on a full-time basis. The remaining four interviewees were then asked whether they had later contemplated leaving,

some time after starting their businesses. As Figure 274 indicates, none of the interviewees had later contemplated leaving. However, where five enterprises were concerned, the interviewee associated with them was (still) contemplating having a foot in both camps. Figure 275 shows us that none of the remaining interviewees actually left in due course - and that the one who had contemplated a foot in both camps had still not got around to organising this.

The two academic entrepreneurs who left the university and the one who was intent upon arranging to have a foot in both camps were asked what had made them decide to leave, wholly or partially. Figure 306 details the reasons they gave, and shows that efforts to group and characterise those reasons were not successful in this instance, each reason seemed to constitute its own, separate category. These particular academic entrepreneurs left.

- * because of their promotion prospects,
- * to achieve personal fulfilment;
- and/or * due to the need for control of commercialisation

It could be argued that promotion prospects is not the correct category for the reason given, that this reason should be grouped with personal fulfilment, since the academic concerned was clearly determined to pursue his interests, come what may. However, close examination of the transcript of the interview leads the investigator to the conclusion that promotion prospects is the appropriate category and descriptor, for the academic concerned had been involved in another entrepreneurial venture for many years prior to this. He had not been promoted since setting up this first venture and experience led him to believe that it would be more rewarding on this occasion to pursue his business interests outside the university, rather than inside - which he would otherwise have done.

Chapter 4 introduced the concept of entrepreneurship being a response to one of two types of stimulus. In this scenario, entrepreneurs are either "pushed" into entrepreneurship by events happening in or characteristics of the organisation in which they were previously located, or they are "pulled" towards entrepreneurship by attributes of the activity of entrepreneurship itself, or the particular manifestation of the entrepreneurial venture in question, or perhaps by events or opportunities to which the entrepreneurial venture might respond - such as capitalising on a particular market opportunity. If we group the categories identified in terms of these two "super-categories", we obtain the following result:

- * push (promotion prospects);
- * pull (control of commercialisation)

Personal fulfilment is not so straightforward to "super-categorise" in this manner. The name of the category suggests something intangible, unquantifiable but unquestionably alluring - *ie.* a "pull" factor. However, after considering the reason categorised in this manner and examining the transcript of the interview, the investigator came to the conclusion that the academic concerned was implying that the university offered no suitable challenges. If this is a justifiable interpretation, it is probably more appropriate to "super-categorise" it as a "push" factor.

In that event, two of these academic entrepreneurs were probably "pushed" into forsaking/intending to partially forsake the university for their businesses, while the other was "pulled" towards controlling the commercialisation process in preference to responding to the demands of the university.

Finally, those academic entrepreneurs who had stayed in the university were asked why they had stayed, instead of leaving (partially or wholly) to devote more time to their

business interests Figure 307 details their reasons and shows that efforts to group and to characterise them were not entirely successful in this instance; with one exception, each reason seemed to constitute its own, separate category Four of the six academic entrepreneurs stayed in the university

- * because of their main interests;
- * because of insufficient profit levels,
- or * because of concern about security.

"Super-categorising" these in terms of "push" versus "pull" is not quite appropriate, given that these interviewees' starting point was the university, not their business However, we could "super-categorise" them in terms of the "pull" of the university versus "deterrent" aspects of the businesses

- * pull (main interests),
- * deterrent (profit levels, security).

One could argue about whether security represents the "pull" of the university's well-regarded pension scheme, or a "deterrent" aspect of working in a small business.

However, examination of the interview transcript revealed that the interviewee himself actually used the word "deterred" - hence the decision to "super-categorise" it in this way. It would seem, then, that two of these four academic entrepreneurs were "pulled" towards staying by the opportunity which the university offered for pursuing their main interests, while the other two were "deterred" from cutting loose from the university to pursue their business interests - despite one having contemplated the idea

Case Analysis:
York University

11.6 York University

11.6.1 Origins

The five interviewees from York were asked what idea(s) they had hit upon which were being/had been exploited via the five enterprises with which, as a group, they were associated ⁽²⁾ - and how they had got their idea(s). As Figure 308 shows, the source(s) of their idea(s) varied somewhat. Efforts to group and characterise those sources yielded 6 fairly distinct categories. These particular academic entrepreneurs got their ideas from:

- * teaching;
- * grant-aided research,
- * personal expertise,
- * contract research/consultancy,
- * supposed demand,
- and/or * demand

Clearly, these categories could be reduced to just four if grant-aided research were grouped together with contract research/consultancy, and supposed demand were grouped together with demand. However, it was felt that this might be practising reductionism for the sake of it

In view of the commonly levelled criticism that academics tend to be more preoccupied by technology "push" than market "pull", it would have been interesting to categorise the initial idea for their enterprises in this way, too. Unfortunately, this question was not explicitly posed, which makes this difficult. On the face of it, the source of some ideas (eg sources categorised as teaching, grant-aided research, expertise) strongly suggests technology "push" rather than market "pull". However, the enterprise based on a student project is actually the result of market "pull", the problem solved by the student was posed by a commercial organisation which, having seen the solution, was interested in it

being further developed for its own use - a need which the organisation pointed out was not exclusively theirs. Moreover, those who cited contract research or consultancy as the source of their entrepreneurial idea were presumably aware of a degree of market interest. Finally, sources categorised as demand and supposed demand suggest that market "pull" was involved to some degree - or at least the *perception* of market "pull".

All five interviewees volunteered information on their motives in pursuing their entrepreneurial idea(s). As Figure 309 indicates, the reasons they gave seemed to fall into four distinct categories of motive

- * income generation;
- * university's preferred mode of exploitation,
- * personal fulfilment,
- and/or * third party benefit.

11.6.2 Business Experience, Role Models, Networks

Efforts were made to establish whether these interviewees from York had any business experience prior to founding/co-founding their first enterprise, especially small business experience. As Figure 241 shows, not one of the five had any business experience as such, however, one had worked in industry - in a scientific/technical and then a managerial capacity, to the point where it could be argued that his seniority and remit (market development) gave him considerable insights into business, albeit large businesses.

The interviewees were then asked whether any of their close family had owned or run a small or medium-sized business. As we can see from Figure 242, one of the five interviewees reported that his great grandfather had owned and run a business - as a result of which his father had not had to work, being a "*gentleman of private means*"; another

reported that both his grandparents had owned and run their own businesses. All three businesses were relatively small (<80 employees in one instance, <50 in the other two instances). One of these remarked that numerous members of his American wife's family had run their own businesses, too - often at the same time as being employed on a full-time basis, he observed that he had been struck by how much more positively disposed Americans are than their British counterparts to having a go at business.

The interviewees were asked whether, prior to setting up their first enterprise, they had known any other *academics* who had set up in business - either at their own university or any other. As Figure 243 reveals, four of the five reported that they had known/known of other entrepreneurial academics. Two had known other members of their own department who had founded/co-founded a company - indeed, one reported that he had been urged to go into business by an academic entrepreneur from his department. One had known a fellow member of the same university who had gone into business, while two had known of academic entrepreneurs from other UK universities.

Of the four interviewees who had known/known of other academic entrepreneurs, none had made use of this potential network, as Figure 244 shows. One remarked that he felt an entrepreneurial colleague in his own department did not provide an example from which he could benefit, the others gave no reason.

11.6.3 Interaction with the University

The five interviewees were asked whether, when first seriously considering their business idea, they had known what their university's policy was *vis-a-vis* academics starting up business ventures. As we can see from Figure 245, two reported that they had had no knowledge whatsoever when the thought first struck them. The other three - who had hit

upon their business ideas some years later - had known that a few academics from York had a hand in a number of small companies, however, only one had detailed knowledge, derived from academics in his own department who had co-founded a company.

Where the first two were concerned, ignorance of the university's policy - if, indeed, there was any - led them to believe that seeking permission to found a company would be fruitless, that they would be refused permission. Accordingly, each embarked upon a course of action which he felt would circumvent this supposed obstacle. One decided that ultimately he would leave the university, however, he opted to test out his entrepreneurial capabilities from the security of a "safety net" by seeking a year's leave of absence at the outset. The other decided to present the university with a *fait accompli* by signing a lucrative commercial contract which he was offered, despite having no authority to sign it.

Where the two with a superficial knowledge of the university's policy were concerned, ignorance of greater detail was irrelevant, one was approached by the university with a view to setting up a company, rather than the other way around, the other had already established his first entrepreneurial venture just before being given a short-term contract at York - with the explicit remit of devoting half his working week to investigating the possibility of setting up a business to commercially exploit IP which was generated within the department in question. Where the interviewee with fairly detailed knowledge was concerned, the extent of his knowledge was less material, perhaps, in so far as he was not one of the founder members of the company; he was invited to become a partner some time after the university's policy had been established by the founders and a *modus vivendi* agreed.

None of the five would-be academic entrepreneurs tried to operate a business venture covertly. Figure 310 shows to which member of the university each initially spoke - and

to whom, if anyone, each subsequently spoke; it also shows the direction of the approach (*ie* academic to university or university to academic), it takes in the first/only entrepreneurial venture founded by the academics in question, and also subsequent ventures, where appropriate, finally, it shows the interviewee's status at the time. Figure 311 shows the objective(s) of the discussions between the entrepreneurial academics and the representative(s) of the university indicated in Figure 310 Figure 312 details the academics' expectations of the outcome of the discussions, while Figure 313 details the actual outcome

It is clear from Figure 310 that York had developed a routine for dealing with the question of academics getting involved in entrepreneurial ventures of one sort or another This routine dates back to the beginning of the 1980s, at least, and the key players were, in sequence, the Finance Officer and the Vice-Chancellor Moreover, these key players did not play a purely reactive role, as Figure 310 reveals, where two out of the five academic entrepreneurs are concerned, the initial approach came from the Finance Officer, not the academic - although in one case the academic concerned had consciously endeavoured to engineer something of the sort happening Despite having developed this routine, it was not publicised, with the result that academics who already had one entrepreneurial venture on the go were aware of it, while would-be academic entrepreneurs embarking on their first venture might not be

We can see from Figure 311 that in three of the four instances in which academic entrepreneurs/would-be academic entrepreneurs approached the university (rather than the other way around), they had had very specific objectives, only one went seeking advice on the best way forward However, Figure 312 shows us that in another three instances, they did not know what outcome to expect - and only one felt confident enough to suggest that

the venture would have gone ahead irrespective of the university's reaction

Figure 313 shows that in every instance the university's actual response was positive from the perspective of the academic entrepreneur - with the possible exception of one who was approached by the university, there is nothing to indicate that he was particularly unhappy with the framework in which he had previously conducted his entrepreneurial activities - viz his research group, despite difficulties he had experienced in relation to research staff⁹. It is noticeable, though, that the outcome in every instance was a separate company - either an independent academic spin-off company, a joint venture with members of the academic staff and/or a third party or a wholly-owned university company. There are no instances of the university agreeing to the establishment of a departmental commercial arm - simply because none of the academic entrepreneurs interviewed specifically wished to create this kind of entrepreneurial venture. However, since there are a number of departmental commercial arms operating at York, we should probably not read anything into this lacuna. Indeed, when considering these findings, it must be remembered that these five academic entrepreneurs in no way constitute a representative sample, we should not conclude that would-be academic entrepreneurs who put their plans for company start-up to the Finance Officer and/or Vice-Chancellor would necessarily elicit a positive response nowadays.

The five interviewees were next asked whether the university had played any role in helping them start up their business venture. In this context help was defined as making available (on whatever basis - *eg gratis* or for some form of payment) equipment, instrumentation, accommodation, technical or secretarial support staff, communications, in-house professional advice, referral to external sources of professional advice, funding of any sort and infrastructure assistance (*eg practical* assistance with things like company

registration, billing, debt collection, tax, VAT, administration, publicity *etc*) or any other form of help the interviewees cared to mention. As we can see from Figure 250, where five of the six enterprises founded/co-founded by these interviewees were concerned, the interviewees recollected at once that the university had played a role in helping them set up their business venture. This figure did not increase to six out of six upon further questioning, suggesting that academics at York were well aware of the help which the university had given.

Figure 314 details the types of assistance provided by the university, both initially, in the lead-up to and the aftermath of start-up, and later on, once the business was established. As we can see, initially all five businesses received assistance with accommodation, communications and use of equipment and instrumentation. Apparently, assistance in the form of in-house professional advice was perceived to be rare, while none of these enterprises were referred to outside professional advice. Nor, it was claimed, did any of them receive infrastructure assistance - but the investigator has grounds for doubting some interviewees' memories, since evidence was found of some of these businesses using the university newsletter to publicise their activities ⁽⁴⁾. Finally, Figure 314 shows us that with the passing of time, as a group these businesses depended somewhat less on the university for their particular types of assistance - with the exception of communications. However, it is interesting to note that some did not make themselves completely independent of the university. Later, although dependency on the university for use of equipment and instrumentation diminished a little, use of communications and accommodation remained very high.

The five interviewees were asked whether they had been satisfied with the role (if any) which the university had played in helping them to set up their business(es). Figure 252

indicates their satisfaction levels in relation to each enterprise with which the five interviewees were associated, excepting one business which had been founded prior to the interviewee taking up employment at York. It seems that satisfaction levels at York exhibit polarisation, with two thirds expressing complete satisfaction and the other third not really satisfied at all. In only one instance does this satisfaction derive from the fact that the university played no role at all in helping the entrepreneur set up the business. This particular entrepreneur had felt that the university was not commercial enough in terms of its outlook and procedures to play any meaningful role in the company; moreover, he had presumed that it did not have spare capital to invest.

The two who expressed something other than complete satisfaction were asked why they had been dissatisfied to a greater or lesser degree. Figure 315 details their responses. Attempts to group them were not appropriate, but attempts to characterise them yielded two opposing categories, interestingly. These two interviewees explained their dissatisfaction in terms of the university's

- * financial profligacy
- and *
- * risk aversion

11.6.4 Intellectual Property Rights

The five interviewees were asked whether the enterprise(s) they had founded/co-founded were intended to be "hard" or "soft" - or a combination of the two. As Figure 254 shows, at the outset, none of the enterprises were intended to be "hard", "widget-based" operations, two were intended to be "soft", R&D/consultancy-based operations and two a combination of "hard" and "soft" ⁽⁹⁾. Having established this, they were then asked whether they had needed to obtain a license from the university - or, indeed, any other organisation - to allow them to exploit the IP in question. Despite the fact that at the

outset two of these enterprises were intended to be a combination of "hard" and "soft", only one had sought to obtain licenses from the various owners of the IPR.

Figure 316 summarises the reasons given by the other academic entrepreneurs for their enterprise not having a license. As we can see, in two instances the IPR took the form of expertise/know-how which was not licensable. In the other two instances, the businesses had been founded before/after the academic had been employed at York and there is no evidence to suggest that the university could have legitimately claimed ownership.

When the interviewees were asked whether the enterprise(s) they had founded/co-founded were still "soft"/a combination of "hard" and "soft", it transpired that at least one had undergone a critical transformation over time. This particular enterprise had changed from "soft" in its original incarnation, through a combination of "hard" and "soft" to 100 per cent "hard". However, the IPR in the products to be marketed by the enterprise had been generated by company employees in company time and the university had no claim over it.

The academic whose enterprise had been obliged to obtain licenses for the IPR it wished to exploit was asked whether he had found the negotiations difficult, and whether he had been helped by anyone. This particular would-be academic entrepreneur reported that he had negotiated unaided with the BTG in relation to the exploitation of some "products", and with the university in relation to others. He observed that he had found negotiations with the BTG extremely difficult, the company had been obliged to agree to terms which were widely regarded as punitive. In contrast, negotiations with the university had been relatively easy, despite obstacles. The university had been in dispute with the academics who generated the IP over the question of ownership; he had overcome this obstacle by

persuading both parties to assign to the company whatever ownership they thought they had, in order that the IPR could be exploited

Only one of the six enterprises with which these interviewees were associated was obliged to give the university a return on its IPR in the form of royalties. However, the university was entitled to a return in the form of dividends and, potentially, sale of equity in three of these enterprises.

11.6.5 Demands of the Enterprise

The interviewees were asked a series of questions which, it was hoped, would give some indication of the scale of their businesses and the demands which their businesses placed upon them. At the outset, as Figure 254 revealed, none of the enterprises were intended to be "hard", "widget-based" operations, two were intended to be "soft", R&D/consultancy-based operations and four a combination of "hard" and "soft". (The reader may recollect that since two of the interviewees were entrepreneurially involved with the same company, only six enterprises are characterised here, rather than seven.) The interviewees were asked when the enterprises with which they were associated had started up, whether they personally were still in business, whether the enterprise(s) they had founded were still in business, and if so, whether the character of their enterprise(s) had changed substantially in the intervening years.

In order not to jeopardise the anonymity of the interviewees, the start-up dates of each enterprise have not been individually listed. However, Figure 256 shows the age range, the average age and the aggregate number of business years achieved by the eight enterprises. Clearly, at least one of these enterprises is only 2 years old, but the age range of 2-9 years, the average age of 4.5 years and 27 aggregate business years should indicate

that most of these businesses have survived beyond the first year, in which it is estimated that a significant percentage of new businesses fail. As Figure 317 shows, three (60%) of the five confirmed that they were still in business - though not necessarily in the context of the first business they had started. A fourth was still involved with the business - but as an employee, the partners had opted to split the company in two and sell it on to two different multi-national companies. The one interviewee who was no longer involved with the business at all had sold his share in it and left it. Figure 317 also shows that only one (17%) of the six businesses founded by these academics was no longer in operation in 1990. This was not due to failure, however - quite the opposite, in order to expand, the activities of the business had been transferred to a new enterprise operating in a different legal framework. Finally, Figure 317 shows that all but one of the seven enterprises had maintained their original character. One had changed each time the legal framework within which it operated had changed - from "soft" through a combination of "hard" and "soft" into a two separate operations, one "hard", one "soft".

The interviewees were then asked whether, at the outset, they had made long-term projections about the future of their enterprise(s). As we can see from Figure 258, where at least four of the six enterprises were concerned, the interviewees had made a long-term projection; it is not clear whether the remaining two did so or not. Figure 259 reveals the projections made with regard to these four enterprises. As we can see, one has been categorised as an ambitious, "infinite" projection, while another has been categorised as a finite but growth-oriented projection. The remaining two have been categorised as finite and limiting projections. The co-founder of one of the latter commented that expansion beyond, say, a maximum of 15 employees would threaten the communal approach to the business's activities which its partners and employees currently enjoyed. Significantly,

perhaps, this was the enterprise which was founded at the university's request, because it perceived the work being done by the research group in question to be too much of a liability for the university to bear. This comment suggests that in some ways the business was being run with much the same ethos as the original research group, and that it was probably what has been called a "lifestyle" business

Attempts were made to gauge the actual growth of these six businesses in terms of the turnover attained and the number of employees. This could not be done in an entirely satisfactory manner, since it was impossible to obtain strictly comparable data. Ideally, the investigator would have wished to establish for each enterprise the turnover for the financial year ending 1990 and the number of employees, and relate this information to the age of the business. As we have seen, however, some enterprises were no longer in business in 1990, where some were concerned, interviewees had parted company with the enterprise some time before 1990 and did not have up-to-date information. It was felt, though, that some impression of the actual growth of most of these enterprises could be gauged by dint of establishing the turnover and the number of employees in 1990 or the last year the enterprise was still in operation or the last year in which the interviewee was associated with the enterprise. Figure 260 indicates the range of annual turnover achieved by five of the six businesses, the average turnover and the aggregate turnover for all five. With an annual turnover ranging from £150,000 to £2,000,000 and an average turnover of £700,00, it should be clear that most of these were being run as fairly serious businesses, not as hobbies by dilettantes. Figure 261 reveals the range of employees, the average number of employees and the aggregate number of employees in the six businesses being investigated in this study. Again, with employee numbers ranging from 4 to 50 and an average of 19 employees, it is clear that few of these were being run on "one man and a dog" basis.

The interviewees were next asked whether they had gone into business as sole traders or whether they had had partners at the outset - and if so, how many, and who they had been. As Figure 262 shows, only one enterprise was run by a sole trader at the outset, in this instance, the business was wholly-owned by the university. In the other five instances, the number of partners over and above the interviewee ranged from one to five, with a slight bias in favour of just one partner. Figure 263 reveals how, in relation to the enterprises under consideration, the interviewees had identified their business partners. It is evident that the vast majority were fellow academics. Minority sources ranged from the university to family members, private sector individuals and the public sector. Out of the 15 business partners under consideration, only two - the private sector individual and the public sector partner - could be described as "professional". In fact, however, the public sector partner did not exercise its right to have a representative on the board of the company, in practice, therefore, only one of the 15 business partners had had *bona fide* business skills and experience. (It is worth noting that by 1990 only two of the six enterprises had taken on board one or more additional partners in the context of the original legal framework. In one instance, the additional partner was another academic, in the other, the academic entrepreneur had succeeded in obtaining seven rounds of venture capital funding - and had acquired a raft of new partners in the process.)

Given the lack of business experience of all but one of would-be academic entrepreneurs and all but one of the active business partners, the interviewees were asked which role(s) they had assumed at the outset in the enterprises which they had founded/co-founded, which role(s) had been assumed by their business partners and whether they had taken on employees with managerial responsibilities. It is clear from Figure 318 that at the outset only one of the five enterprises had taken on employees with managerial responsibilities. This was not the enterprise which had a "professional" business partner, so, initially, at

least, three of the five would-be academic entrepreneurs had shouldered the burden of both technical development and business development with neither "professional" partners nor employees with managerial responsibilities; however, one of the three had some business experience himself, albeit large business experience (Eventually, it is worth noting, two of the three enterprises which had neither "professional" business partners nor employees with managerial responsibilities acquired some "professional" expertise - indeed, one would argue that he acquired an excess of "professional" expertise, this last academic entrepreneur acquired a raft of new partners, as already mentioned; the former employed a technical products manager)

Finally, given the burden apparently shouldered by most of these academic entrepreneurs, they were asked how much time they had devoted to the business on average - per week/month/year - and whether they had devoted this time during evenings and/or weekends and/or during the week (*ie* Monday to Friday, 9-5). Figure 265 reveals the difficulty inherent in trying to establish an objective, comparable, quantifiable measure of how much time each devoted to their entrepreneurial activities in an organisation which had no use for time-sheets (*ie* the university). The result is at best impressionistic.

11.6.6 Interaction with the Department

It was felt that investigation of the interaction of these academic entrepreneurs with their department might be a more productive line of analysis. The interviewees were first asked to answer as honestly as they could and say whether they thought their entrepreneurial activities had ever impacted on their academic commitments, and if so, whether they perceived this to be a positive or a negative impact. As we can see from Figure 266, one felt that there had been a negative impact - albeit a minimal impact, while three felt that their business activities had impacted positively on their academic commitments. Figure

319 presents the views of all four on the particular ways in which their business activities had impacted on their academic commitments, be it positively or negatively. Attempts to group and characterise them yielded four distinct categories. These particular academic entrepreneurs saw the impact of their business activities on their academic commitments as

- * deleterious to teaching,
- * beneficial to teaching;
- * beneficial to research,
- and/or * forming a mutually beneficial bridge to industry

As we can see, all three of those who perceived a negative impact cited injury to teaching, whereas benefit to research and a mutually beneficial bridge to industry were one-off perceptions.

The interviewees were then asked whether they had ever asked any favours *vis-a-vis* their academic commitments. Figure 268 indicates whether the interviewees recollected having asked any favours (formal or informal) in order to accommodate the demands of their business(es). As we can see, only one of the five academic entrepreneurs from York reported that he had not asked some kind of favour in order to accommodate his business activities, this particular academic was on a short-term contract, at the end of which he had the freedom to leave the university and devote all his time to the two businesses with which he was associated. Of the other four, two had sought favours which required formal agreement on the part of their HoD and the university. One wanted a year's leave of absence, in order to properly put his entrepreneurial abilities to the test, a second had sought a part-time contract (*pro-rata*) so that he could officially devote a third of his week (*ie* Monday to Friday, 9-5) to the business - something his colleagues argued he had been

doing unofficially for some time already, but on a full-time salary. The other two had asked favours which required no more than a relaxed attitude to scheduling on the part of the students and, on occasion, fellow members of staff.

The interviewees were next asked how their colleagues had reacted to their business activities. As Figure 320 reveals, between them the five academic entrepreneurs apparently elicited a wide range of reactions. Efforts to group and characterise those reactions yielded the following five categories.

- * jealousy,
- * Schadenfreude,
- * unknown quantity;
- * acceptance;
- and/or * support

Clearly, we could group these into fewer, more embracing categories. However, it was felt that there were subtle but important differences between, say, jealousy and Schadenfreude and simply grouping them into fewer, more embracing categories might constitute the kind of reductionism which qualitative research usually strives to avoid. Moreover, there is nothing to prevent us from grouping these categories into "super-categories". So, for example, we could group them into:

- * negative (jealousy, *Schadenfreude*);
- * unknown (unknown quantity);
- and * positive (acceptance, support)

From the number of "mentions", we can deduce that these five academic entrepreneurs *perceived* their colleagues' reactions to be predominantly negative. This contrasts strongly

with their perceptions of their HoD's reaction. Asked how their HoD had reacted to their business activities, the interviewees gave virtually uniform answers, as Figure 270 shows. Only one HoD was reported to have been antipathetic, and he was described as a very traditional academic. It is worth noting, though, that two of these academic entrepreneurs had their HoD as a business partner - indeed, the HoD had been the prime mover in setting up the company.

The five academic entrepreneurs were next asked whether they had researched or even considered York's promotion criteria prior to setting up in business, whether they had been promoted since starting their first business and whether they were worried about their promotion prospects. (In the context of this investigation, promotion was interpreted in the widest sense, ranging from promotion from Research Fellow to Lecturer to promotion from Professor to HoD/Dean/Pro-Vice-Chancellor *etc*.) As we can see from Figure 271, none had even considered the university's promotion criteria prior to setting up in business. Two remarked that this would have been superfluous, since both had intended to leave shortly after founding the business, in any case. Figure 271 also reveals that none of the three who were still a member of staff had been promoted after starting his first business. Moreover, Figure 271 shows us that two of the three had begun to worry about their promotion prospects. It had crossed their minds that their business activities might not be regarded positively after both had applied for promotion and been rejected; this had not struck them before, since in both instances, it was the university which had persuaded them to found a company - largely because of the risk it perceived to attach to their research activities. The third was not concerned about his lack of promotion because he had long since recognised that someone who has interests other than striving for yardage of research publications was unlikely to be given a Chair.

The five academic entrepreneurs were then asked whether, at the outset, they had contemplated leaving the university in order to devote time and energy to their business(es) without having to worry about the attitude of their colleagues and their HoD - or their promotion prospects. As **Figure 272** reveals, where two enterprises were concerned, the interviewees associated with them had contemplated leaving at the outset. We can see from **Figure 273** that two interviewees - the same two - did actually leave, while another, who had not contemplated leaving, had ended up with a foot in both camps, officially spending two thirds of his time in the university, one third in the business. The remaining two interviewees were then asked whether they had later contemplated leaving, some time after starting their businesses. As **Figure 274** indicates, neither had later contemplated leaving - and as we can see from **Figure 275** neither actually did leave.

The two academic entrepreneurs who left the university were asked what had made them decide to leave, as was the academic entrepreneur who had a foot in both camps. **Figure 321** details the reasons they gave, and shows that efforts to group and characterise those reasons were not successful in this instance; each reason seemed to constitute its own, separate category:

- * personal fulfilment;
- * not a career academic;
- and/or * university ultimatum.

Chapter 4 introduced the concept of entrepreneurship being a response to one of two types of stimulus. In this scenario, entrepreneurs are either "pushed" into entrepreneurship by events happening in or characteristics of the organisation in which they were previously located, or they are "pulled" towards entrepreneurship by attributes of the activity of

entrepreneurship itself, or the particular manifestation of the entrepreneurial venture in question, or perhaps by events or opportunities to which the entrepreneurial venture might respond - such as capitalising on a particular market opportunity. If we group the categories identified in terms of these two "super-categories", we obtain the following result:

- * push (university ultimatum, not a career academic).

Personal fulfilment is not so straightforward to "super-categorise" in this manner. The name of the category suggests something intangible, unquantifiable but unquestionably alluring - *ie.* a "pull" factor, and there is little doubt that this academic entrepreneur was lured by perceived opportunities to make money (betting on horses, business start-up *etc etc*). However, it was apparent that this had been triggered by the low level of academic salaries, and as such it could constitute a "push" factor. Examination of the interview transcript revealed that shortly before this question was formally posed, the interviewee had devoted some time to airing his views on his experience of the academic life. He described his fellow academics as "*sleeping*" their lives away, and focussing, when they were awake, on "*trivial problems*". The investigator concluded from this that it would not be unreasonable to "super-categorise" personal fulfilment as a "push" factor. In that case, it is evident that these particular academic entrepreneurs were not "pulled" into forsaking the university for their businesses; they were "pushed" by events happening in or attributes/perceptions of attributes of the university itself.

Finally, those academic entrepreneurs who had stayed in the university were asked why they had stayed, instead of leaving to devote more time to their business interests. This question was also put to the interviewee who had a foot in both camps, since this arrangement had not been his idea. Figure 322 details their reasons and shows that efforts

to group and characterise those reasons were not successful in this instance; each reason seemed to constitute its own, separate category. Two of the five academic entrepreneurs stayed in the university because of:

- * their career aspirations;
- or *
- * their wish to retain a link with academia

"Super-categorising" these in terms of "push" versus "pull" is not quite appropriate, given that these interviewees' starting point was the university, not their business. However, it is evident that both categories could be "super-categorised" as "pull" factors, and if we accept this, it would seem that two of the five entrepreneurs were "pulled" towards staying in the university by certain attributes/perceived attributes of academic life.

Cross-Case Analysis

11.7 Cross-Case Analysis

11.7.1 Introduction

In section 11.1 the reader was reminded that the questionnaire which was administered to entrepreneurial academics, Questionnaire D, was designed to ascertain their awareness of their university's policy *vis-a-vis* the entrepreneurial exploitation of IP, the manner in which that policy was implemented in relation to their own aspirations and their attitude to policy and practice, as they had experienced them. The four case-by-case analyses presented the relevant findings for each university under three principal headings for simplicity and ease of comparison: the academic entrepreneurs' interaction with their university (*ie* the centre); their attitude and experience in relation to intellectual property rights; and their interaction with their own departments. In order to place their dealings with the university in context, the case-by-case analyses also focussed on the extent to which these academic entrepreneurs had business experience and on strategies they might have used to overcome inexperience (*eg.* use of networks, finding "professional" partners or employees); it was felt that it would not be unreasonable for a university to want to take such things into account when determining how to respond to proposals to entrepreneurially exploit IP over which it might have a claim. Similarly, the case-by-case analyses also focussed on the character of these academic entrepreneurs' businesses and the demands those businesses placed upon them, for it was felt that the extent and nature of those demands could affect their interaction with the department.

As qualitative studies tend to, in the course of the fieldwork data were elicited which were peripheral to the main focus of this investigation, but nonetheless of considerable interest

The observant reader will have noticed that the investigator could not resist setting the entrepreneurial scene in the opening sections of the case-by-case analyses, focussing on the

origins of these academic entrepreneurs' business ideas and their motives for pursuing them, rather than putting them on the back burner or forgetting about them. Since qualitative studies give the investigator the freedom to change direction or to refine or augment objectives tentatively set at the outset, it was felt that the opportunity to shed light on issues commonly raised in relation to entrepreneurship in general and academic entrepreneurship in particular should not be squandered - especially given the paucity of data relating to the UK. The investigator would have liked to do this in the context of the case-by-case analyses. However, it was felt that presenting some of these data on a case-by-case basis might have trivialised them, while presenting certain data could have jeopardised the anonymity of the interviewees. Accordingly, this option was rejected. It was decided, instead, to present the data and accompanying analysis in the section devoted to cross-case analysis.

As a result, section 11.7 will be structured as follows. Sub-section 11.7.2 will consider the question "Are entrepreneurs born or 'made'?". Sub-section 11.7.3 will consider whether academic entrepreneurship might not be not a contradiction in terms. From sub-sections 11.7.4 to 11.7.6 the cross-case analysis will focus on the main objective of this part of the investigation, namely these academic entrepreneurs' awareness of university policy *vis-a-vis* the exploitation of IP, the manner in which that policy was implemented in relation to their own aspirations and attitudes. Specifically, sub-section 11.7.4 focusses on their interaction with their university, sub-section 11.7.5 explores IPR-related issues, while sub-section 11.7.6 focusses on their interaction with their department. Throughout section 11.7, a cross-case comparison will be made, replicated categories will be identified and their "robustness" will be evaluated. Efforts will also be made to ascertain whether any of the four cases is exceptional at either a macro or micro level - and if so, the likely reasons.

11.7.2 Are Entrepreneurs Born or "Made"?

In Chapter 4 it was indicated that researchers have devoted considerable attention to the question of why it is that some people try their hand at entrepreneurship and others do not. To recap briefly, according to one theory entrepreneurs are born rather than "made". Other theorists have proposed an association between entrepreneurship and certain aspects of the socialisation process, thereby making the first steps on the journey towards the opposing theory - namely that entrepreneurs can be "made". These theorists, as we saw in chapter 4, are concerned with nurture rather than nature, highlighting a reported tendency for entrepreneurs to come from families with involvement in small business - whether on the basis of self-employment or as small business owners, or to have been exposed to other entrepreneurial role models, *etc etc*.

Other theorists again have progressed considerably further on the journey towards the opposing theory, proposing, for example, that in some cases entrepreneurship is a response to the organisation in which they previously worked, that some entrepreneurs are "pushed" into entrepreneurship, rather than "pulled" towards it as a result of possessing entrepreneurial traits *etc etc*. Another way-station on the journey towards entrepreneurs being "made" rather than born is occupied by those who claim that entrepreneurs tend to found their first businesses in their thirties (or forties) Yet another way-station on this journey is occupied by those who believe that the incidence of entrepreneurship is variable, depending on the character of the culture, that the incidence of entrepreneurship will increase in the context of an "entrepreneurial culture". At the very end of this journey we find theorists who believe that entrepreneurship can be taught, in much the same way that, say, brain surgery can be taught It is not unusual for these theorists to (try to) put their beliefs into practice, by running courses such as the Graduate Enterprise Programme.

Since it was not this study's intention to examine this question, no attempt was made to elicit comprehensive data relating to it. However, it is possible to analyse these academic entrepreneurs in terms of their gender, their sibling position, their motivation, the number of businesses each founded, their family's involvement in small business, their exposure to other entrepreneurial role models, their age upon founding their first business and to consider whether they were "pushed" or "pulled" into entrepreneurship, when they founded their businesses and whether they have been "made" into entrepreneurs by virtue of dedicated training.

Gender

One of the most striking characteristics of the 25 academic entrepreneurs interviewed for this study was their gender: they were all male. Efforts were made to locate female academic entrepreneurs in each institution, but none were identified until towards the end of the interview process, when one interviewee reported that his female partner had been a postgraduate student in his department and, briefly, a full-time member of staff there, too. This would appear to support claims that the incidence of female entrepreneurship in the UK is very low. However, the ratio of male to female academics in UK universities does not reflect the proportion of males to females in the population at large, nor even the proportion of male to female graduates from whom academics might be recruited. There is a bias in favour of males which is particularly pronounced in science and engineering disciplines. Since the four universities under investigation were not exceptional where this was concerned, it may not be appropriate to draw too many conclusions from this finding.

Sibling Position

In the course of the fieldwork, data happened to be elicited in relation to the sibling position of 24 of the 25 academic entrepreneurs. Five (21%) of the 24 mentioned that they

were an only child; eleven (46%) mentioned that they were the eldest child, while a further 4 (17%) mentioned that they were the eldest son. Thus, 84 per cent of these academic entrepreneurs were the first/only child or the first son, a figure which far exceeds the percentages reported by researchers who first proposed that there was an association between sibling position and the likelihood of a person becoming an entrepreneur. Significantly, perhaps, one of the four exceptions was the only interviewee to voluntarily let his business wither, while another was the only interviewee to have a business idea and create the framework in which it could be exploited - only to hand it over to the employees and play no further part in it.

Motivation

The four case-by-case analyses have already addressed the question of the motivation of these academic entrepreneurs - using data which were freely volunteered rather than deliberately elicited. If we compare the categories proposed in Figures 240, 279, 294 and 309, we see that income generation occurs in all four cases and personal fulfilment occurs in three of the four. Fourteen of the other fifteen categories occur only once, however, while just one appears twice. How should we interpret this? Do these academic entrepreneurs have genuinely diverse motives or is it possible that the groupings and characterisations (*ie.* the categories) proposed are not the most insightful or appropriate? Judging by the number of "mentions" (*ie.* motives which were categorised this way), income generation would appear to be an appropriate, insightful and robust category; it covers four (36%) of the eleven reasons given by the academic entrepreneurs from Hull, six (32%) of the nineteen reasons given by those from Liverpool, two (13%) of the sixteen reasons given by those from Strathclyde and four (44%) of the nine reasons given by the academic entrepreneurs from York. In other words, 29 per cent of these 25 academic entrepreneurs were motivated by income generation. If we subject personal

fulfilment to the same analysis, we find it covers four (36%) of the eleven reasons given by the academic entrepreneurs from **Hull**, two (11%) of the nineteen reasons given by those from **Liverpool**, and two (22%) of the nine reasons given by the academic entrepreneurs from **York**. In other words, 15 per cent of the 25 academic entrepreneurs were motivated by reasons which have been categorised as personal fulfilment, suggesting that this is also a fairly appropriate, insightful and robust category. This cannot be said about the other fifteen categories, of course.

In order to test the possibility that the categories proposed were not the most insightful or appropriate, the motives volunteered by these academic entrepreneurs were re-examined, to see whether other, more embracing categories could be identified. Despite the fact that they appear to be appropriate, insightful and robust, income generation and personal fulfilment were also re-examined. It quickly became clear that motives categorised as income generation exhibited significant differences in terms of the **beneficiary** of the income. Pursuing this line of thought, it was found to be possible to group the 55 reasons given into just six new categories without any need to force them. As **Figure 323** shows, these six categories are:

- * personal outlook;
 - * suggestibility;
 - * self-benefit;
 - * second-party benefit;
 - * third-party benefit;
- and *
- * technology promotion

If we accept these new categories as insightful, meaningful, appropriate and usually robust, what light do they shed on the motivations of these 25 academic entrepreneurs as a

group? As chapter 4 mentioned, the earliest studies of motivation characterised entrepreneurs as obsessed with the pursuit of riches and power - although this is now questioned by many researchers. Although it is evident that 13 (24%) of the 55 motives for entrepreneurially exploiting IP have been categorised as self-benefit, less than half of these embody the concept of wealth-generation (and there is no indication these academic entrepreneurs were motivated by power). However, the concept of wealth-generation crops up in 13 (87%) of the 15 reasons categorised as second-party benefit, suggesting that financial altruism was far more often the motive than the pursuit of personal wealth. In fact, judging by the number of "mentions", while self-benefit of one sort or another (financial or otherwise) categorises only thirteen (24%) of the 55 reasons given, second-party benefit categorises sixteen (29%) of the 55 reasons and third-party benefit categorises a further fourteen (25%) of the 55 reasons. Thus, where these 25 academic entrepreneurs are concerned, the data elicited would appear to support those theorists who discount the pursuit of personal riches and power as a motivating force. The data would rather tend to suggest that many of these academic entrepreneurs were motivated by altruism - certainly, the 30 motives categorised as second-party benefit or third-party benefit support this interpretation. No references to altruism were encountered in the literature on entrepreneurship in general. However, that is no obstacle to hypothesising that UK *academic* entrepreneurs tend to be motivated by altruism.

What do the other three categories tell us? Clearly, the investigator was not in a position to conduct the tests required to establish psychological profiles - nor was this an objective of the study. However, two of the other three categories, personal outlook and suggestibility are of peripheral interest here. Seven (13%) of the 55 motives volunteered have been categorised as personal outlook and these motives would appear to have something to do with the psychology of these individuals, as would suggestibility, which

categorises just three (5%) of the 55 motives volunteered (As an aside, it is worth noting that suggestibility is interesting in that it differs from the other five categories. It characterises business start-up situations which were a response to suggestions or pressure from others; where the other five are concerned, the academic entrepreneurs themselves seem to have conceived of the idea and driven it forward)

Number of Businesses Founded

As Figure 254 revealed, between them these 25 academic entrepreneurs had founded 42 businesses, an average of 1.68 each. Figure 324 shows the distribution of these businesses between the 25, ranging from 6 down to zero, since one had joined the business after its inception. As we can see, 60 per cent of these academics had founded only one business, while just 24 per cent had founded two, only 12 per cent had founded more than two businesses. Interestingly, none of those who had founded more than one business had done so following the failure of their first business; the two whose businesses had failed or been allowed to wither had not tried again. Another four had wound up their first business but continued the activities of the first business in the context of their second on grounds of rationalisation or the need for a different legal framework. Of the six who had sold their share of the business, two had become employees in what had formerly been their own company, three were employed by other organisations and only one had gone on to found first one, then another business, selling up and starting again on each occasion. Instead of founding businesses sequentially, six (24%) of the 25 were running multiple businesses in parallel, in fact, two of them were running/about to run four businesses in parallel. It is evident, then, that for 40 per cent of these academic entrepreneurs, entrepreneurship was an iterative process - and that the iteration could be parallel as well as sequential.

Family Involvement in Small Business

The question of family involvement in small business has already been considered in the case-by-case analyses. The data for all four cases were presented in Figure 242, which revealed that 44 per cent of the 25 academic entrepreneurs had reported that close members of their family had been self-employed or had owned one or more small businesses, whereas 56 per cent had reported no family involvement in self-employment or small businesses. At first sight, these figures might not seem to support claims that entrepreneurs tend to come from families with small business involvement. However, it is imperative not to consider these figures in isolation but to compare them to the incidence of entrepreneurship in the general population. Of course, it is not easy to put a figure on this, principally because it has exhibited considerable fluctuation during the twentieth century. Given that these academic entrepreneurs ranged in age from 34 to 60 when interviewed, it is difficult to justify picking a single year for comparison. However, let us consider reports (eg by Curran, 1986) that between 1979 and 1984 the number of self-employed in the UK rose by 32 per cent, as a result of which one in ten of the labour force was said to work for him/herself by the mid-1980s - the highest proportion since the 1920s. If we compare this to the 44 per cent who reported that close members of their family had been self-employed or owned and run a small business, this group of 25 academic entrepreneurs would certainly appear to substantiate claims that entrepreneurs tend to come from families with small business involvement.

Exposure to Other Entrepreneurial Role Models

The question of exposure to other entrepreneurial role models has already been considered in the case-by-case analyses, too. The data elicited are of limited value in the debate about the association between entrepreneurship and exposure to entrepreneurial role models - firstly because the question posed was concerned specifically with *academic* role models.

Secondly, it was concerned with abstract knowledge of role models as well as in-the-flesh acquaintanceship, which may make the data even less comparable with those elicited in earlier relevant studies. Thirdly, this same question was not posed to non-entrepreneurial academics from the same departments, in order to get some idea of the norm.

Nonetheless, it is interesting to note, as Figure 243 showed us, that 20 (80%) of the 25 claimed either knowledge of or acquaintanceship with other academic entrepreneurs, most of whom were located in the UK, if not in the same university. Interestingly, the spread - from 67 at Strathclyde to 80 per cent at Liverpool is relatively narrow. Moreover, there is no need to adjust the figures by removing the *suggestible* academic entrepreneurs from the reckoning, since all three reported that they had known or known of academic entrepreneurs. Given that the incidence of academic entrepreneurship in the UK is estimated to be as low as five per cent, this finding probably lends support to claims that there is an association between entrepreneurship and exposure to role models

Age Upon Founding the First Business

Since the age of the academic entrepreneurs was deliberately omitted in the case-by-case analyses, Figure 325 reveals how old 24 were when they founded their first/only business, the 25th is omitted since he became a partner in an existing business. As we can see, in one sense these academic entrepreneurs conform to the pattern established by other researchers, in that relatively few of them founded their first/only business in their twenties. This is particularly unsurprising in the case of *academic* entrepreneurs who have to complete their first and possibly second degrees before becoming a member of staff, which takes up most of their early twenties. It is noticeable, though, that the mode was the

age band 35-39, and that the same number founded their first/only business in their thirties as those in their forties. This is slightly earlier than one might have expected for European entrepreneurs and appears to conform more to the pattern established for Americans - though perhaps not American academics.

Figure 326 shows the ages of these academic entrepreneurs for all the businesses they founded. Inevitably, the percentage founding a business in their twenties is very low, at 10 per cent. As we can see, 27 per cent founded their business(es) in their thirties, while 45 per cent founded their business(es) in their forties. Just 19 per cent founded their business(es) in their fifties, in contrast. On the face of it, these findings would appear to support the claims of certain theorists in relation to *academic* entrepreneurs, at least where the age distribution is concerned. However, the most commonly proposed explanation for this age distribution may be another matter. The reasoning tends to go: no time or money for entrepreneurship in their twenties, still trying for career advancement in their thirties, disillusioned in their forties, too tired or concerned about their pension in their fifties. Let us consider the validity of this interpretation in relation to the data elicited in the course of this study.

Figure 327 reveals the status of each academic entrepreneur at the time of founding his business(es) - excluding the one who became a partner in an existing business. At three of the universities, Hull, Liverpool and York, the status of these individuals at the time of founding their first/only business ranged from Fellows on short-term contracts to senior academics - Professors at Hull and Liverpool, a Reader at York. At Strathclyde, however, we find only senior or relatively senior academics - Senior Lecturer or above. If we take these academic entrepreneurs as a group, we can deduce from Figure 327 that at the time that group members founded their first/only business, 38 per cent were

Professors, 4 per cent were Readers, 17 per cent were Senior Lecturers, 25 per cent were Lecturers and 8 per cent were Fellows on short-term contracts (The remaining 8 per cent were not employed in a university at the time). It could be argued that since 59 per cent of these academic entrepreneurs had overcome the main promotional hurdle - *ie.* promotion to Senior Lecturer, they had achieved all that they might expect to achieve in a UK university, given the fact that the 1960s expansion led to a promotion bottleneck in many universities, particularly those (like York) which were founded during the 1960s. Even if we exclude Readers and Senior Lecturers from the picture, nearly 40 per cent of these academic entrepreneurs were Professors by the time they founded their first/only business - and as one semi-jokingly remarked. *"It's a dead-end job Where do you go from here?"* If we take into account the status of members of this group who founded subsequent businesses, we find that 20 per cent were Lecturers or Fellows on a short-term contract, a further 20 per cent were Senior Lecturers, yet another 20 per cent were Readers and 30 per cent were Professors. Again, the distribution is skewed towards those of more senior status. If we perform the same analysis on third, fourth, fifth and sixth businesses, we find that these were founded exclusively by Readers or Professors

These findings suggest that not only the age distribution but also the status distribution conforms to the pattern established by other researchers. However, this is still only circumstantial evidence. The question of disillusionment will be pursued shortly

"Pushed" or "Pulled"?

As we have seen from the case-by-case analyses, the question of whether these academic entrepreneurs were "pushed" into entrepreneurship as a reaction to the organisation in which they had previously worked or "pulled" towards it as a result of possessing entrepreneurial traits *etc* was not explicitly posed. Conclusions therefore have to be drawn

on the basis of circumstantial evidence, yet again.

The fact that 13 of the 25 academic entrepreneurs were still members of staff and had not changed the terms of their contract is not very helpful when it comes to determining "push" versus "pull". Does this mean that 52 per cent were not "pushed" into leaving, or does it mean that 52 per cent were not "pulled" into leaving? This is why each case-by-case analysis focussed separately on those who (partially or wholly) left the university to pursue their entrepreneurial interests and those who stayed but pursued them anyway.

Figure 328 summarises the judgements made in the four case-by-case analyses with regard to the twelve who (partially or wholly) left. It would appear that 75 per cent were "pushed" into entrepreneurship, while only 17 per cent were "pulled"; remarks made by one of the twelve suggested that he was both "pushed" and "pulled". Three of the twelve who left indicated that they had been concerned about their promotion prospects - **but they felt that this concern had arisen as a result of their entrepreneurial activities, rather than the other way around.**

By way of comparison, **Figure 329** summarises the judgements made in the case-by-case analyses with regard to the academic entrepreneurs who stayed in the university. It would appear that 57 per cent were "pulled" into staying in the university, whereas 29 per cent were "deterred" from leaving; unfortunately, data were not elicited in relation to the remaining 14 per cent. Interestingly, only four (29%) of these admitted to being worried about their promotion prospects; **however, they felt that this concern had arisen as a result of their entrepreneurial activities, rather than the other way around.**

Seven (50%) of the academic entrepreneurs who stayed in the university volunteered the information that they were really not interested in the conventional academic career

structure - indeed, one said he had refused a promotion which was offered to him. However, four of these had a Chair at the time they volunteered this information, two were Readers and the other was a Senior Lecturer - and whether they were interested or not, two had been promoted since founding their business. This does not conjure up a picture of academics turning to entrepreneurship because they were disillusioned about their promotion prospects. On the other hand, it could be argued that they were less than enchanted by the more senior posts on offer in the UK university system. To that extent, the interpretation outlined under the last heading may not be wide of the mark, even though most of the academics interviewed did not admit to seeing their entrepreneurial activities as a reaction to disenchantment. However, if entrepreneurship is a reaction to a measure of disenchantment, the disenchantment must have set in early, for five of the seven were in the 35-39 age band when they founded their first business; only two were in their forties.

Founding Dates

Since the founding dates of the businesses started by these academic entrepreneurs were deliberately omitted from the case-by-case analyses for fear of jeopardising the founders' anonymity, the aggregate founding dates are shown in Figure 330. It is very clear from this that, in this group of academic entrepreneurs at least, the proportion founding a business in the 1960s was negligible. The trend seems to have begun in the 1970s, when just under a quarter founded their business(es), and picked up considerable speed in the 1980s, when nearly three-quarters founded their businesses. With one exception, the 1980s were also when all the second, third, fourth, fifth and sixth businesses were founded. This pattern certainly seems to support widely made claims that the 1980s saw the (contrived) return of an entrepreneurial culture in the UK, after decades of a decidedly non-entrepreneurial culture. However, it is distinctly possible that there are alternative or

complementary explanations - such as the reduction in "comfort levels" in UK universities resulting from the financial cuts imposed during the 1980s, the removal of tenure for all but those who retained their existing status *etc etc*

Training for Entrepreneurship

Not one of these entrepreneurs participated in any kind of entrepreneurial training - not even training for particular business skills - prior to launching their businesses. However, one had spent periods at London Business School and Ashridge School of Management doing post-experience courses in general management, management accounting *etc*, sponsored by his employer. In the most extreme sense of the concept, though, none of these entrepreneurs was "made" by virtue of training

Conclusions

In conclusion, then, data gathered in relation to these 25 academic entrepreneurs appear to support many of the claims made about entrepreneurs in general, and academic entrepreneurs in particular. These findings also serve to reinforce the view that the forces which cause some people, unlike others, to try their hand at entrepreneurship, unlike others, are manifold and complex

11.7.3 Academic Entrepreneurship: A Contradiction in Terms?

When the investigator embarked upon this study, an academic colleague remarked. "Academic entrepreneurship? It's a contradiction in terms, isn't it?" - an exaggerated reference to studies which identified significantly greater inadequacies in academic entrepreneurs than were displayed by entrepreneurs in general. As we saw in chapter 4, inadequacies identified include

- * a technical rather than a market orientation,
- * weak or non-existent business skills,
- * failure to compensate for weak or non-existent business skills by bringing in partners or recruiting staff with the requisite skills,
- * low aspirations - or no aspirations at all for the future of the business,
- * inadequate or non-existent business plans;
- * limited financial resources,
- * insufficient emphasis on product development and over-emphasis on R&D as the company's activity, to the detriment of the company;
- * underestimating the capital required to finance an extensive technology development cycle and inability to raise capital from institutional sources
etc etc.

These and other inadequacies are said to explain why businesses started by academics have been found to exhibit slower growth and a higher failure rate *etc etc*. The case-by-case analyses explored several of these areas - viz. whether these academic entrepreneurs had business experience; the number and source of their partner(s), the extent to which they recruited staff with complementary skills; the role(s) played by the academic entrepreneurs, their partners and their staff; whether they had made use of any entrepreneurial networks at their disposal, the sources of their business ideas and their orientation (*ie.* technology "push" *versus* market "pull"), the character of their business(es) (*ie.* a "hard", product-oriented business, a "soft", R&D-oriented business or a combination of the two) and their aspirations for the business. The case-by-case analyses also took a brief look at the actual failure rate of their business(es) and the actual growth of the business(es) which survived. These areas will now be re-examined on a cross-case basis.

Business Experience

As we can see from **Figure 241**, only three (12%) of these 25 academic entrepreneurs had any prior business experience, though another five (20%) had prior work experience which was similar enough to have given them some insights into the prerequisites of business. That is to say, 17 (68%) of these academics were complete novices; moreover, none of this particular sub-set had any kind of training which might have stood them in good stead. This was particularly pronounced at **Hull**, where the academic entrepreneurs had no experience of either sort. It was only marginally less pronounced at **Liverpool** and **York**, where only one had either business experience or prior, relevant work experience. By these two measures, the academic entrepreneurs from **Strathclyde** were exceptional in that only one of them had no prior business experience or work experience which was similar enough to have given some insights into the prerequisites of business.

Number and Source of Partners

Figure 262 has already detailed the number of partners involved in 33 of the 42 businesses founded by this group of academic entrepreneurs, eight had to be excluded from this analysis on the basis that they were not/not yet operating in the kind of legal framework which required the number of partners to be formally and explicitly identified. **Figure 262** showed that 42 per cent of these businesses involved a total of two partners - that is to say, in fourteen instances the academic interviewed had just one partner. A further 24 per cent of these businesses involved a total of four partners - that is to say, in eight instances the academic interviewed had three partners. A further 15 per cent involved a total of three partners - that is to say, in five instances the academic interviewed had two partners. For the rest, a total of one partner, five partners or six partners were equally (un)common.

We can deduce from these figures that the businesses founded by this sub-set of academic entrepreneurs averaged 3.03 partners per business, which is somewhat higher than has been reported in the literature relating to European academics founding new technology-based businesses (see, for instance, McQueen & Wallmark (1982) who report an average of 1.82 partners per business founded). However, there were marked differences between the four universities, with businesses founded at Strathclyde exhibiting the highest average (3.85), those at York the next highest (3.50), those at Liverpool a somewhat lower average (3.00) and those founded at Hull by far the lowest average (2.00). The higher averages at Strathclyde and York are partly explained by the university's involvement in joint ventures with members of the academic staff. The university was a partner in half the businesses co-founded by the six academic entrepreneurs from Strathclyde and a third of the businesses co-founded by the five academic entrepreneurs from York. In contrast, the university was a partner in just a seventh of the businesses founded at Liverpool and only an eighth of the businesses founded at Hull.

Figure 2.63 has already detailed the source of these academic entrepreneurs' business partners. It shows that at 51 per cent, by far the largest proportion were fellow academics, the university accounted for 15 per cent, while family members accounted for another 15 per cent. Institutional and individual partners from the private sector played a negligible part in these businesses, as did public sector partners. We can deduce from the case-by-case analyses that just 20 (30%) of the 67 partners had any prior business experience - and one of those chose not to play an active part in the business in question. We can also see from the case-by-case analyses that those partners with business experience were not distributed evenly in the four universities. In fact, 65 per cent of them were partners in businesses founded at Strathclyde, whereas only 17 per cent of them were partners in businesses founded at Liverpool and York. Hull had the lowest distribution, at just 13 per

cent.

Finally, the case-by-case analyses revealed that by 1990 additional partners had been acquired in only eight instances, it was also revealed that in one instance, a partner had been shed. Four of the eight businesses acquiring additional partners had been founded at Hull, two at York and two at Liverpool. At Hull and Liverpool, these were "professional" partners, whereas at York at least one was yet another academic with no business experience.

Staff Recruitment

Figures 264, 288, 303 and 318 have already shown whether the enterprises founded by these academic entrepreneurs recruited staff with business skills to complement their own, more technical skills. We can deduce from these Figures that at the outset only four (10%) of the 39 businesses detailed hired staff with appropriate skills - to act as managing director in two instances, marketing director in another and business manager and projects manager in the fourth. The case-by-case analyses made it clear that this state of affairs did not change significantly with the passing of the years, since only seven (18%) of the 39 enterprises eventually hired staff with specific business skills. Four of the enterprises which took this step had been founded at Hull, two at York and one at Liverpool.

Role(s) Played by the Academic Entrepreneurs in Their Business(es)

The case-by-case analyses established the role which the academic entrepreneurs from each university played at the outset in their business(es). The results were presented in Figures 264, 288, 303 and 318. For ease of comparison, the roles, if any, played by the academic entrepreneurs themselves have been re-presented in Figure 331. This shows us that the role most commonly assumed by the academic entrepreneurs founding the 39

was 1.07 roles, at Strathclyde it was 1.09 roles, while at York the average was 1.0 role

businesses detailed here was managing director: in 12 (28%) of the 39 businesses, this was the role assumed. It also shows us that the next most common role was director - without portfolio or with a portfolio, but excluding technical or managing directorship: in 10 (23%) of the 39 businesses this was the role assumed. The next most common roles were chairman and technical director: each role was assumed in 6 (14%) of the 39 businesses. It is evident that the other roles (company secretary, partner) were seldom assumed. It is also evident that where two businesses were concerned, the academic entrepreneurs themselves played no role at all. It is worth noting that some academic entrepreneurs assumed more than one role, the average at Hull was 1.25 roles, at Liverpool the average per entrepreneur

Figure 331 shows us that these business roles were not evenly distributed between the four universities. At Hull and York, managing director was the most common role, while at Liverpool partner and director without portfolio *etc* were the most common roles and at Strathclyde technical director and director without portfolio *etc* were the most common roles. To a certain extent, this reflects Strathclyde's policy of not allowing academics to become managing director of companies exploiting "hard" IP; one - but noticeably, not both - of those who assumed the role of managing director at Strathclyde were running "soft" businesses. However, the one instance of an academic entrepreneur at Strathclyde assuming the role of managing director of a business exploiting "hard" IP is explained by the fact that the "hard" IP in question belongs to a third party, not the university.

If we regard managing director, partner and possibly chairman as being the most demanding roles in business terms, then in 22 (56%) of the 39 businesses, the academic entrepreneurs concerned assumed one of these most demanding roles. Again, this was not

evenly distributed between the four universities. The highest proportions of academic entrepreneurs assuming these most demanding roles were at York (71%) and Hull (70%), the figure for Liverpool was 58 per cent, while the lowest proportion was found at Strathclyde (25%) - possibly a result of the university's policy that academics wishing to start up companies to exploit "hard" IP must accept that the role of MD/CEO is taken by an experienced entrepreneur.

Existence and Use of Entrepreneurial Networks

The case-by-case analyses have already considered whether the academic entrepreneurs from each of the four universities had known/known of other academics who had started a business before they themselves started their first/only business. Figure 243 summarises the findings and shows us that 20 (80%) of the 25 had known/known of other academic entrepreneurs prior to setting up in business themselves. These are distributed remarkably evenly between the four universities. It appears that 88 per cent of the academic entrepreneurs from Liverpool had known/known of other academic entrepreneurs - as had 83 per cent of the academic entrepreneurs from Hull and 80 per cent of those from York. The incidence at Strathclyde is somewhat lower at just 67 per cent, but the difference between the incidence at Strathclyde and at the other three universities is not statistically significant. It may therefore be no more than coincidental that proportionately fewer of the interviewees from the university whose Principal has so publicly and unambiguously embraced the enterprise culture had known/known of other academic entrepreneurs. The relatively high percentage for of academic entrepreneurs from Hull who had known/known of other academic entrepreneurs is not unexpected, given that all the HoDs and Deans interviewed there had spontaneously named several academic entrepreneurs who had spun-off from that university and had talked about them in some detail and with a certain pride. However, interviewees from Liverpool and York did not overtly exhibit the

same kind of pride in their academic entrepreneurs, on the contrary - at York some had clearly been the source of controversy rather than pride, and to a certain extent, this was true at Liverpool, too. Alternatively, perhaps, academic entrepreneurs are more conspicuous in universities where they are a relative rarity, the investigator is not able to comment on this possibility since no attempt was made to identify how many businesses had been started by academics at each of the four universities. In short, the reason for this skewed distribution eludes the investigator.

The case-by-case analyses have also established whether the 20 academic entrepreneurs who had known/known of other academic entrepreneurs had made use of this potentially insightful network. We can see from Figure 244 that only 3 (15%) had done so - and that none of those from York and only one apiece from Hull, Liverpool and Strathclyde had made use of this potentially insightful network.

Source(s) of Business Idea(s) and Business Orientation

The sources of these academic entrepreneurs' business ideas and their business orientation (*i.e.* technology "push" versus market "pull") have already been considered in the case-by-case analyses. Data were explicitly elicited in relation to the sources of the academic entrepreneurs' business ideas; the data in question were presented separately for each university in Figures 239, 278, 293 and 308. For each case, the sources mentioned by the academic entrepreneurs were grouped and characterised into categories. If we compare these categories across all four cases, we find a fair degree of replication.

Three categories (contract research/consultancy, supposed demand/market, demand) are found at all four universities. One (grant-aided research) is found at three of the four, while another two (academic tool, role models) are found at two universities. Of the ten

categories, only four are not replicated in at least one other university. Tax avoidance is found only at Liverpool; collaboration is found only at Strathclyde, expertise and teaching are found only at York. The investigator considered the possibility of categorising the sources of business ideas in a different, more inclusive way - in the manner that it was possible to categorise these academics' motives for business start-up in a more inclusive and insightful way. However, she concluded that this was not really possible on this occasion - and that, for this group of academic entrepreneurs at least, these should probably be regarded as valid categories, notwithstanding the fact they are not replicated.

As we can see from the aggregate data, shown in Figure 332, judging by the extent of the replication and the number of "mentions", the most robust categories are contract research/consultancy, supposed demand/market and demand. Grant-aided research is probably the next most robust, together with academic tool. Role models is clearly less robust - only marginally more so than the four categories which are not replicated.

As an aside, it is worth noting before we leave this topic that some of these categories are particularly interesting in that, if careful attention is paid to the ordering of the sources of ideas, they have the capacity to illustrate very clearly different dimensions of the category in question. For instance, the sources grouped under supposed demand/market range from the highly specific and definite (acquiring a company which had gone into receivership) to the more general and vague (belief there was a market opportunity), from the reactive (acquiring a company *etc*) to the proactive (commissioning a consultant to identify opportunities within the department). This contrast between the highly specific and definite and the more general and vague is exhibited by role models, academic tool and, to a certain extent, demand, too.

Let us move on now to the question of these academic entrepreneurs' business orientation. It was made clear in the case-by-case analyses that this question was not explicitly posed and that any conclusions that might be drawn should be seen as highly tentative since they derive from the investigator's interpretation of other, related data - namely data on the source of these academic entrepreneurs' business ideas. On the basis of this approach, it would appear that very few of these academic entrepreneurs' business ideas were exclusively the result of technology "push". It would seem that in most instances, market "pull" - or the *perception* of market "pull" - played some part in the decision to start a business to exploit the idea in question. The investigator would not wish to make a stronger statement than this, however.

Character of Business(es)

The intended character of the businesses founded by the academic entrepreneurs from each university has already been described in the case-by-case analyses and summarised in **Figure 254**. We can see from **Figure 254** that 14 (34%) of the businesses founded/co-founded by these 25 academic entrepreneurs were intended to be "hard", "widget-based" operations compared to 16 (39%) which were "soft", R&D/consultancy-based operations, the remaining 11 (27%) were a combination of "hard" and "soft", the shell company set up in a tax haven purely to minimise the tax due on royalties was excluded from this analysis. The case-by-case analyses also addressed the question of whether these businesses had maintained their original character. This information was presented for each individual institution in **Figures 257, 287, 302 and 317**. If we aggregate the information given in these four **Figures**, we find that thirty six (88%) of these 41 enterprises had maintained their original character.

The proportion of "hard" businesses founded by this group of 25 seems to be considerably higher than the proportions reported in the literature (see, for instance, Lamont (1972), who found that just 9.6% of the businesses founded by academics which he studied were "hard", while 71.4% were "soft" and 19.0% a combination of the two) However, much of this literature relates to the 1960s or 1970s; the picture may have changed by now.

If we take another look at Figure 254, we see that the proportion of "hard" to "soft" to combination businesses is not distributed evenly between the four institutions. Hull incubated the highest proportion of "hard" businesses, York the lowest - in fact, none of York's businesses were intended to be "hard" at the outset. Liverpool incubated the highest proportion of "soft" businesses, closely followed by Strathclyde, while Hull incubated the lowest proportion; the differences are not so marked here as they are in relation to "hard" businesses, however. And finally, York incubated by far the highest proportion of combination businesses, and Liverpool the lowest.

The reader's attention has already been drawn to claims that academic entrepreneurs place insufficient emphasis on product development, concentrating primarily or even exclusively on R&D as the company's main/only activity, to the detriment of the company. The relationship between the character of these businesses and their performance will be considered below, once the size and growth rate of these businesses has been established.

Business Aspirations

The question of the academic entrepreneurs' business aspirations has already been addressed in the case-by-case analyses. Figure 258 summarised this information and showed us that where 7 (17%) of these businesses were concerned, certainly, the academic founders/co-founders had made no long-term projections at the outset. Bearing in mind

that data relating to eight (20%) of the businesses were not elicited, we can deduce from Figure 258 that in every instance where data were elicited, interviewees at Strathclyde and York made a long-term business projection. However, a long-term projection was made in relation to only eight (73%) of the eleven businesses for which data were elicited at Liverpool, and in only four (50%) of the eight businesses for which data were elicited at Hull.

Figure 259 showed us the long-term projections of the 26 (63%) who are known to have engaged in this exercise. We can deduce from this that 15 (58%) of those 26 made what have been categorised as ambitious, "infinite" projections for their businesses, while 7 (27%) made what have been categorised as finite but growth-oriented projections. The remaining 4 (15%) made what have been categorised as finite, limiting projections for their businesses. If we look at the distribution of long-term projection types between the four universities, we find that academic entrepreneurs at Strathclyde were the most ambitious: eight (80%) of the ten made projections which have been categorised as ambitious and "infinite", while the other two (20%) made projections which have been categorised as finite but growth-oriented. Academic entrepreneurs at Hull were the next most ambitious, with two (50%) making ambitious, "infinite" projections and two (50%) making finite but growth-oriented projections. Those at Liverpool were the second least ambitious, with four (50%) making ambitious, "infinite" projections, two (25%) making finite but growth-oriented projections and another two (25%) making finite, limiting projections. Academic entrepreneurs at York were clearly the least ambitious, with just one (25%) making an ambitious, "infinite" projection, another (25%) making a finite but growth-oriented projection and two (50%) making finite, limiting projections.

Failure Rate

The case-by-case analyses indicated in passing whether enterprises which were no longer in business had been failures or not. It is worth noting that the usual definition of a "failure" is that the business in question is no longer solvent and is therefore legally obliged to cease trading. If we apply that rigorous definition, then *none* of the 42 businesses founded/co-founded by the 25 academic entrepreneurs was a failure. However, if we use a somewhat looser definition, then it could be said that three (7%) of the 42 businesses were failures. One was a failure in the sense that the entrepreneur and the university were unable to agree on the terms of the license required to exploit the IP in question; the company is still "*on the shelf*" but inactive; this could certainly be described as a failure. Another was under-capitalised as a result of the principal investors (venture capitalists) finally investing far less than had originally been proposed. The original projections called for a turnover of £1m by the second year of business, £5m by the fourth year. In fact, the business turned over only £90,000 in the second year and the university exercised its right to withdraw the company's license, with the result that the company was wound up before it brought its product to market. The last was allowed to become moribund by the partners after one went to live and work in another part of the country.

Even taking these "failures" into account, the failure rate exhibited by these academic entrepreneurs is clearly considerably lower than is generally reported in the literature. We should be circumspect about the way we regard this figure, however. The entrepreneurs did not constitute a random sample and many of them were selected precisely because they were (still) in business, that is to say, the investigator did not necessarily hear about academic entrepreneurs whose businesses had failed. The true failure rate may be considerably higher.

Business Size and Growth Rate

The case-by-case analyses have already established the size of the businesses associated with each university - in terms of the aggregate and the average annual turnover, and aggregate and the average number of employees

Let us first consider the aggregate and the average annual turnover figures. The aggregate turnover figures are obviously of little more than academic interest in the cross-case analysis, since the number of businesses generating these figures ranges from five to twelve - and these numbers are determined in large part by the investigator's decision concerning how many academic entrepreneurs to interview in each university. The average turnover figures are of interest, however. It is clear from Figure 260 that if we rank the four universities in descending order by average annual turnover, we arrive at the following:

- 1 York (£700,000)
- 2 Hull (£667,500)
- 3 Liverpool (405,166)
- 4 Strathclyde (248,571)

We can perform the same analyses of size in terms of employee numbers. Again, the aggregate number of employees is obviously of little more than academic interest in the cross-case analysis, since the number of businesses generating these numbers ranges from six to fourteen - and these numbers are largely determined by the investigator's decision concerning how many academic entrepreneurs to interview in each university. The average numbers of employees are of interest, however. It is clear from Figure 261 that if we rank the four universities in descending order by average numbers of employees, we arrive at the following

- 1 York (19)
- 2 Hull (15)
- 3 Liverpool (8)
- 4 Strathclyde (7)

Of course, the information detailed in Figures 260 and 261 simply provides a snapshot of the enterprises from each of the four universities - an indication of their size in either 1990 or the last year the enterprise was still in operation or the last year in which the interviewee was associated with it. It gives no indication of the relative growth of these enterprises, since it takes no account of their relative ages. Thus, it is possible that the enterprises founded at York are ranked first in relation to both these measures because they have been in business longer - and conversely, that the enterprises founded at Strathclyde are ranked last because they are relatively new.

In order to overcome this deficiency, the data were subjected to the following analysis: the annual turnover of each individual enterprise in 1990 (or the last year the enterprise was still in operation or the last year in which the interviewee was associated with the enterprise) was divided by its age in years. The resulting figures for each university were totalled and the average calculated. The averages were then divided by 1000 to obtain manageable indices of the size of the businesses associated with each university, measured by turnover, relative to their age - *ie* to give an indication of their growth. The results of this (admittedly crude) analysis are shown in Figure 333. If we then rank the four universities in descending order using these growth indices, we arrive at the following:

- 1 York (150.00 *per annum*)
- 2 Strathclyde (119.83 *per annum*)
- 3 Hull (101.19 *per annum*)
- 4 Liverpool (62.02 *per annum*)

The data relating to employee numbers were subjected to the same analysis. The number employed by each individual enterprise in 1990 (or the last year the enterprise was still in operation or the last year in which the interviewee was associated with the enterprise) was divided by its age in years. The resulting figures for each university were totalled and the average calculated. This gave a series of indices of the size of the businesses associated with each university, measured by employee numbers, relative to their age - *ie.* to give an indication of their growth in terms of job-creation. The results of this (admittedly crude) analysis are shown in Figure 334. If we then rank the four universities in descending order using these growth indices, we arrive at the following

- 1 York (4.14 *per annum*)
- 2 Strathclyde (2.50 *per annum*)
- 3 Hull (2.09 *per annum*)
- 4 Liverpool (1.20 *per annum*)

These two sets of rank orders provoke the following question: if we are to accept that businesses founded by *academics* generally exhibit slower growth and a higher failure rate than new technology-based businesses in general - and that this is due in large part to academics entrepreneurs' inadequacies relative to their non-academic counterparts, then why do we obtain this rank order? If we rank the academic entrepreneurs from each university in terms of adequacy as measured by relative business experience, the extent to which their partners were "professional", the extent to which they recruited staff with complementary skills, the extent to which they themselves assumed the most difficult business roles at the outset, the extent to which they utilised potentially available networks which were available to them, the extent to which they made business projections and the nature of their business projections (ambitious *versus* less ambitious), and if we then use a crude scoring system to obtain an overall rank order, then we must rank the four

universities in descending order of adequacy as follows:

- 1 Strathclyde
- 2 York
- 3 Liverpool
- 4 Hull

By this admittedly crude measure, there seems to be no more than an approximate correlation between relative adequacy, as measured, and the relative performance of the businesses founded at each university.

This is a good point at which to consider whether there is a relationship between the character of the businesses founded at each university and their performance. Let us first attempt to explore this by measuring performance in terms of annual turnover bands - in other words, let us explore it on a snapshot basis. The information we require is presented in Figure 335. Businesses have been classified as "hard", "soft" or combination businesses on the basis of what they have become, rather than their intended character at the outset. Figure 335 allows us to deduce that if we take these 30 businesses as a group, 46 per cent of the aggregate annual turnover was made by combination businesses, 29 per cent was made by "hard" businesses and 24 per cent by "soft" businesses. On an aggregate basis, then, these 30 businesses founded by academic entrepreneurs appear to conform to the widely held view that "soft" businesses perform least well of the three business characters. However, it is often reported that "hard" businesses perform better than combination businesses - and this is clearly not borne out by these 30 businesses. The combination businesses performed markedly better than the "hard" businesses.

If we take a closer look at Figure 335, it becomes evident that the performance of the three business types in the four universities exhibits considerable variation. The two closest are Liverpool and Strathclyde, where "soft" businesses accounted for the highest percentage of the aggregate annual turnover - at 44 per cent and 55 per cent respectively. Combination businesses accounted for the next highest percentage of the aggregate annual turnover - at 30 per cent and 29 per cent respectively. "Hard" businesses accounted for the lowest percentage of the aggregate annual turnover at Liverpool and Strathclyde - at 26 per cent and 17 per cent respectively. At Hull the picture is quite the reverse. There "hard" businesses accounted for the highest percentage of the aggregate annual turnover - at 64 per cent, while combination businesses accounted for 31 per cent and "soft" businesses accounted for just 5 per cent. It is York which displays the most dramatic difference, however. There, combination businesses accounted for 96 per cent of the aggregate annual turnover, "soft" businesses accounted for just 4 per cent and there were no "hard" businesses.

Let us now measure performance by growth instead of annual turnover. The information we require is presented in Figure 336. It allows us to deduce that if we take these 30 businesses as a group, 39 per cent of the aggregate growth *per annum* was made by combination businesses, 28 per cent was made by "hard" businesses and 33 per cent by "soft" businesses. This is not dramatically different to the percentages obtained by measuring annual turnover on a snapshot basis. However, it is interesting to note that, while the percentage of the aggregate growth *per annum* made by "hard" businesses is virtually unchanged, there is a shift of emphasis where the other two business types are concerned, with combination businesses performing less well than on a snapshot basis, and "soft" businesses performing somewhat better if measured by growth, rather than a snapshot of annual turnover.

If we take a closer look at Figure 336, it becomes evident that the performance of the three business types in Hull and York is unchanged, relative to each other. At Liverpool and Strathclyde, though, "hard" businesses turn out to be the second highest earners, rather than combination businesses, as was the case when measured on a snapshot basis, combination businesses fall into the bottom position. At Hull "soft" and combination businesses performed somewhat better than they did when measured on a snapshot basis, while "hard" businesses performed somewhat worse. At Liverpool, "hard" businesses performed better than they had, measured on a snapshot basis, while "soft" businesses performed somewhat worse. At Strathclyde, "hard" and "soft" businesses performed somewhat better than they had, measured on a snapshot basis, while the percentage earned by combination businesses was revealed to be negligible, measured on a growth *per annum* basis. At York "soft" businesses performed somewhat better than they had, measured on a snapshot basis, but combination businesses still earned 90 per cent of the aggregate growth *per annum*.

On an aggregate basis, then, these findings would appear to confirm the widely-held view that "soft" businesses perform least well of the three business types. However, it is evident that there can be wide variations in the relative performance of these three business types. Indeed, although the relationship is not clear-cut, it seems more likely that the relative proportions of business types account for differences in aggregate performance than relative adequacies/inadequacies of the academic entrepreneurs running them. Liverpool, whose businesses performed least well, has the highest proportion of "soft" businesses. York, whose businesses performed best by every measure, had by far the highest proportion of combination businesses.

11.7.4 Interaction with the University

We turn now to the main focus of this investigation: the academic entrepreneurs' awareness of their university's policy *vis-a-vis* the entrepreneurial exploitation of IP, the manner in which that policy was implemented in relation to their own aspirations and their attitude to policy and practice, as they had experienced them. Sub-section 11.7.4 will concentrate on the interviewees' interaction with their university - *ie* with the centre, since we know from chapters 7-9 that this is where policy (in so far as there was any) tended to be formulated, this was the source of publicity (if, indeed, there was any publicity) and this was where the implementation of many aspects of policy tended to be determined.

Awareness of Policy *Vis-a-Vis* the Entrepreneurial Exploitation of IP

Data relating to the 26 academic entrepreneurs' awareness of their own university's policy *vis-a-vis* the entrepreneurial exploitation of IP were presented in Figure 245. We can see at a glance that when first seriously considering their business idea, 17 (68%) had no prior knowledge of their university's policy. In other words, over two-thirds of these 25 academic entrepreneurs were taking a step in the dark when they first approached their university with a view to discussing their entrepreneurial aspirations. Clearly, these particular academic entrepreneurs were not deterred by this, but one wonders whether others in the same situation might have been deterred.

We can also see at a glance from Figure 245 that lack of awareness of university policy is not evenly distributed between the four universities. There are significant differences. Only 40 per cent of York's academic entrepreneurs were unaware, compared to 100 per cent of Hull's, for instance. If we rank the four universities in descending order of awareness, we

obtain the following rank order

- 1 **York**
- 2 **Liverpool**
- 3 **Strathclyde**
- 4 **Hull**

It would be interesting, of course, to compare this rank order with the rank orders detailed in chapter 7 in relation to the dissemination of information on the removal of the BTG's monopoly, the Research Councils' offer, the university's assumption of rights and responsibilities previously held by the BTG and the government's wish that, in practice, academics should assume responsibility for exploiting their IP if they wished to. Similarly, it would be interesting to compare this rank order with those detailed in chapter 8 in relation to the university signalling its moral support for this by circulating appropriate policy statements and its practical support by creating - and publicising - appropriate frameworks/structures. However, a direct comparison cannot be made because six (75%) of the eight businesses at Hull were founded prior to the removal of the BTG's monopoly and the arrival of the Kingman letter in May 1985, as were seven (50%) of the 14 businesses at Liverpool, five (36%) of the 14 businesses at Strathclyde and three (50%) of the six businesses at York. None of these universities was obliged to have a policy on academic entrepreneurship prior to the date of their submission to the Exploitation Scrutiny Group of the Research Councils. We know, of course, that Strathclyde certainly did have a policy on academic entrepreneurship, dating at least from Sir Graham Hills' arrival as Principal at the beginning of the 1980s. We also know that Liverpool had formulated a policy on academic entrepreneurship by early 1985, just before the arrival of the Kingman letter. However, it is debatable whether Hull and York had a fully-fledged policy before the arrival of the Kingman letter, it seems more likely that they responded on an *ad hoc* basis to proposals which were put to them - and, in the case of York, to

situations where they perceived academics' research activities to constitute a risks to the university.

We could try to separate out those businesses which were founded after the arrival of the Kingman letter - or even after the four universities received their initial letter of authorisation from the Research Councils, but since this would exclude half of the 42 businesses, the numbers concerned become very small. Moreover, they become even smaller if one then takes out of the picture all those who had already founded a business by this date, and therefore had prior experience of their university's approach. In fact, this leaves us with just one academic entrepreneur from Hull, one from Liverpool, three from Strathclyde and one from York - and the one from York was approached by the university rather than the opposite way around, which excludes him from the reckoning

In conclusion, then, over two-thirds of these academic entrepreneurs were unaware of their university's policy *vis-a-vis* the entrepreneurial exploitation of IP and lack of awareness was particularly prevalent at Hull, Strathclyde and Liverpool. However, given the foundation dates of the businesses and the dates when these universities first formulated their policy, we should probably not be too surprised about the lack of awareness at Hull and Liverpool. The lack of awareness at Strathclyde is more surprising, however.

Point of Contact

The case-by-case analyses established which representative(s) of their university each would-be academic entrepreneur contacted with a view to discussing their entrepreneurial aspirations. The data were presented separately for each university in Figures 246, 280, 295 and 310. Ideally, we need to devise an objective, quantifiable way of comparing the

data presented.

In order to do this, we need to take the following into account At Strathclyde the administration had known since the arrival of Sir Graham Hills as Principal at the beginning of the 1980s exactly whose responsibility it was to act as the point of contact for academics wishing to discuss their entrepreneurial aspirations academics could either contact the Principal direct or they could make their approach via the ILO. The immediate outcome would be the same whoever they approached, since they would automatically be referred to the other by whomever they saw first Prior to the arrival of Sir Graham Hill, it was reasonably well understood in the administration that academics with entrepreneurial aspirations had to talk to the Bursar At Hull, since the arrival of the Registrar in the mid-1970s, it had been reasonably well understood in the administration that the point of contact for academics with entrepreneurial aspirations was the Registrar, who would, if he felt it appropriate, refer the aspirant to the Vice-Chancellor. The appointment of the ILO in the mid-1980s injected a little confusion into this otherwise straightforward situation, since it was not clear to the ILO, let alone to other members of the administration, whether the ILO was supposed henceforth to be the first point of contact for academics with entrepreneurial aspirations, in much the same way that devotees of the Legion of Mary commune with their maker via the *intermedium* of Mary, or whether they should continue to approach the Registrar direct. At York it is doubtful whether any formal decision was ever taken about the point of contact for academics with entrepreneurial aspirations. However, during most of the 1980s custom and practice made it clear to all but the most junior members of the administration that the point of contact should be the Finance Officer, who would refer aspirants to the Vice-Chancellor if he felt it appropriate However, the Finance Officer in question retired towards the end of the 1980s; at the same time, a part-time ILO and a full-time deputy were appointed The

investigator has not been able to establish whether the part-time ILO, his full-time deputy or the new Finance Officer was intended to be the new point of contact. At Liverpool it was evidently well understood in the administration that the first point of contact was the ILO, who would refer aspirants to the Registrar and/or the Vice-Chancellor, if he felt it appropriate. However, before the appointment of the current incumbent in 1987, it was not at all clear who the point of contact should be

Given that six of the eight businesses at Hull were founded before 1985 - *ie.* before the appointment of the ILO, one would expect the would-be academic entrepreneurs to have approached the Registrar, if the university's policy in this respect had been well-publicised or, at least, easy for enquirers to establish. And in fact, in three (75%) of the four instances where the would-be academic entrepreneur decided to approach the university - and to do so before 1985, it was the Registrar whom they first approached. If we look at the two businesses founded after the appointment of the ILO, we find that neither went to the Registrar, one went to a Pro-Vice-Chancellor, the other to the ILO. The one who went to the Pro-Vice-Chancellor was fortunate in that he was referred to the Registrar, the one who went to the ILO was unfortunate - in so far as he never received a reply to his letter and he was not referred to the Registrar, indeed, this interviewee's HoD eventually had to take up the matter with the Registrar after getting the impression that the Registrar had not been properly put in the picture

Only four of the 14 businesses at Liverpool were founded after the appointment of the full-time ILO in 1987 - and one of those was founded by an academic who was working out his PRCS agreement prior to leaving altogether, he therefore had no need to approach the university. Of the remaining three, all three approached the ILO and were referred to either the Registrar or the Vice-Chancellor. Interestingly, the would-be founder of a

business started in the early 1970s chose to approach the university's first ever (very part-time) ILO, the HoD of the Department of Industrial Studies, who was a co-founder of UDIL; he was duly referred to the Registrar. With regard to the rest of the aspirants who attempted to approach a representative of the university, three approached their HoD - and got no further, while one made a direct approach to the CEO of the university company, whom he knew socially; the last approached the Research Sub-Committee, which was the appropriate point of contact for the particular form of business he wished to start.

Thirteen of the 14 businesses at Strathclyde were founded after the appointment of Sir Graham Hills as Principal - and in all thirteen instances, the would-be academic entrepreneur made a direct approach to either the Principal or the ILO, as required. In the fourteenth instance, the would-be academic entrepreneur eventually arrived at the Bursar's door, but only after working his way up from the most junior member of the Bursar's staff.

None of the businesses at York was founded after the appointment of the part-time ILO or his full-time deputy, which makes it a little easier to score. In two instances, the approach was made by the university, rather than by the academic. In another instance, the business was founded prior to the interviewee taking up employment at York and no approach was required. That leaves just three instances to consider. In two of those instances, the would-be academic entrepreneur approached the Finance Officer directly, and was referred to the Vice-Chancellor. In the third, the would-be academic entrepreneur approached his HoD with a view to obtaining leave of absence, since he felt sure that the university would refuse him permission to found a company. This last instance could be construed as a failure of communication on the part of the university.

If we apply a rudimentary scoring system to these analyses, we would give academic entrepreneurs from Hull 4/6 (67%) for getting to the right point of contact - though it should be noted that several interviewees indicated that they arrived at the Registrar's door by luck rather than by direction and some arrived there by a devious route. We would give those from Liverpool 6/9 (67%), but those from Strathclyde 13/14 (93%) for getting to the right point of contact. Finally, we would allocate those from York 2/3 (67%) for getting to the right point of contact. Of course, we are not trying to measure the academic entrepreneurs' ingenuity, but their knowledge of university policy. What we conclude from these scores is that in a third of the instances of academics wishing to discuss their entrepreneurial aspirations with the appropriate representative(s) of their university, those from Hull, Liverpool and York did not know whom they should approach - and were not eventually directed to the right person, either. By this measure, then, Strathclyde is quite clearly exceptional.

Objectives, Expectations and Attitude to the Actual Outcome of Discussions

The case-by-case analyses established the objectives of the would-be academic entrepreneurs in discussing their plans with representative(s) of their university. The data were presented separately for each university in Figures 247, 281, 296 and 311. For ease of comparison, the data are summarised in tabular form in Figure 337. We can see from this that in 13 (41%) of the 32 instances in which these would-be academic entrepreneurs discussed their plans with representative(s) of their university, their objective was to get permission to set up a departmental commercial arm to exploit the IP in question. It is clear from Figure 337 that this was the dominant objective for this particular group as a whole. Permission to set up an independent academic spin-off company was the objective in only eight (25%) of the 32 instances, while permission to set up a joint venture with the university was the objective in only two (6%) of the 32 instances, as was permission to set

up a wholly-owned university company Finally, Figure 337 shows that there were only two instances in which the objective was to seek advice on the best way forward. These findings would appear to lend support to one of the conclusions drawn in sub-section 11 7.2 above, namely that many of these particular academic entrepreneurs are motivated by altruism. However, it became clear in the course of this investigation that departmental commercial arms can take a number of forms, particularly where the beneficiaries are concerned, so it would be wise not to place too much emphasis on this

Figure 337 also reveals that there were differences between the four universities in terms of the dominant objectives of the relevant academic entrepreneurs. At Hull, for instance, there were two dominant objectives to set up a commercial arm of the department to exploit the IP in question, and to set up an independent academic spin-off company, setting up a joint venture with the university and simply going for advice on the best way forward were minority objectives for this sub-group At Liverpool and Strathclyde, in contrast, setting up a commercial arm of the department to exploit the IP in question was the one dominant objective of these two sub-groups, setting up independent spin-off companies or joint ventures with the university or, at Strathclyde, a wholly-owned university company were definitely minority objectives At York, meanwhile, setting up a joint venture with the university and getting advice on the best way forward were equally dominant objectives

The case-by-case analyses established the would-be academic entrepreneurs' expectations *vis-a-vis* the outcome of their discussion(s) with the representative(s) of their university. The data were presented separately for each university in Figures 248, 282, 297 and 312. For ease of comparison, the data is summarised in tabular form in Figure 338 We can see from this that in 19 (59%) of the 32 instances, the would-be academic entrepreneurs

expected their university to agree to their proposals. However, in one instance (3%) the academic concerned was merely hopeful, while in another (3%) the interviewee had no real expectations. In four instances (13%) the academic entrepreneurs were uncertain what to expect, however, and in one (3%) instance, the interviewee was doubtful about his chances of being given permission. It should be noted, however, that data were not elicited in relation to six instances (19%) and if these data were available, they might present a different picture. Given the extent of the missing data, there is little value in comparing the distribution of expectations between the four universities. However, it is evident that a greater proportion of would-be academic entrepreneurs from York seem to have been uncertain what to expect than those from any other university, this impression would be unlikely to change no matter what the nature of the missing data. Similarly, it is evident that a very high proportion of would-be academic entrepreneurs from Strathclyde expected their university to agree to their proposals - and this impression would be unlikely to change no matter what the nature of the missing data, either.

The case-by-case analyses established the actual response of the four universities to these academic entrepreneurs' proposals. The data were presented separately for each university in Figures 249, 283, 298 and 313. For ease of comparison, the data is summarised in tabular form in Figure 339. We can see from this that in 25 (78%) of the 32 instances, the university's response was positive from the perspective of the would-be academic entrepreneur - indeed, in one instance (3%), it was very positive. In only six instances *in toto* (18%) was the university's response either mixed (positive and negative), negative or simply zero.

Support Provided by the University

The case-by-case analyses addressed the question of whether the university had helped the academic entrepreneurs set up their business venture - *eg* by making available (whether *gratis* or for some form of payment) equipment/instrumentation, accommodation, technical or secretarial support staff, communications, in-house professional advice, referral to external sources of professional advice, funding, assistance with infrastructure *etc.* The data elicited were presented in Figure 250, which shows us that, taking this group of entrepreneurs as a whole, in 31 (74%) of the 42 instances the university in question had, indeed, provided some kind of help, it is apparent from Figure 250, though, that in 9 (21%) of the 42 instances, the academic entrepreneur did not immediately recognise or recollect that he had been helped by the university. If we compare responses on a cross-case basis, we see that the discrepancy between the initial response and the more considered response was particularly acute at Liverpool, where six (43%) of the 14 academic entrepreneurs failed to recognise or recollect that they had been helped by the university. It was only marginally less acute at Hull, where three (38%) of the academic entrepreneurs failed to recognise or recollect that they had been helped by the university. At Strathclyde and York, however, the academic entrepreneurs all recognised/reclected immediately that they had been helped.

Figures 251, 284, 299 and 314 detailed the types of assistance provided initially and later by the four universities. If we refer back to Figure 70 and Evaluation 9.28 we find that while Liverpool scored 100 per cent for the range of physical and human resources which academic entrepreneurs were allowed to use, York scored only 90 per cent, Hull scored only 70 per cent and Strathclyde scored only 60 per cent. York scored < 100 per cent because it was reluctant to permit academic entrepreneurs the use of personnel (technicians, secretaries *etc.*), though it was prepared to do so on occasion. Hull scored

< 100 per cent because policy dictated that academic entrepreneurs should not use either existing office/laboratory space or extra, dedicated space for their business activities and because the university was reluctant to allow academic entrepreneurs the use of personnel. **Strathclyde** scored < 100 per cent because it was reluctant to let academic entrepreneurs use existing office/laboratory space for their business activities, did not permit use of extra, dedicated space and did not permit the use of personnel (technicians, secretaries etc).

Policy or no policy, **Figure 251** reveals that five academic entrepreneurs at **Hull** used accommodation for their business activities, one used departmental technicians and two used departmental secretaries - and that all of them did so openly and for some form of payment, be it rent or some form of *quid pro quo*. Admittedly, three of these academic entrepreneurs were using university accommodation for their business activities prior to the opening of the neighbouring science park, when university policy allowed this, but two were still using university accommodation nearly five years later, and one had only started to use university accommodation for business purposes in 1989. The investigator was able to establish that the decision regarding ongoing use of accommodation was taken by the HoD in both instances, in a conscious attempt to be helpful to the entrepreneur. **Figure 299** reveals that in eight instances academic entrepreneurs at **Strathclyde** had used university accommodation for business purposes, notwithstanding policy. In most instances this was not surprising, since the business was effectively the commercial arm of the relevant department, or equivalent. However, there were also instances of companies renting university accommodation, suggesting that if the price is right, **Strathclyde** is prepared to be flexible on this score. **Figure 299** also reveals that in five instances academic entrepreneurs had used university secretarial staff and in two instances, they had used technicians. Again, this apparent discrepancy is largely explained by the fact that the

businesses in question were effectively the commercial arm of the relevant department, or equivalent. Figure 314 reveals that in three instances academic entrepreneurs at York had used university technicians or secretaries - in exchange for some form of payment - and since none of these businesses were operating as the commercial arm of their department or equivalent, these decisions were presumably taken at departmental level, perhaps by HoDs exercising their right, rather than the centre's, to make this kind of decision.

In view of the fact that some academic entrepreneurs, at least, seem to have got forms of assistance proscribed or frowned upon by central university policy, it is of interest to establish the types of assistance which they required, as a group. Figure 340 summarises this on an aggregate basis, both initially and later, when the business was established. It is evident that, for this particular group of academic entrepreneurs, the most common type of assistance obtained initially was use of communications, closely followed by use of accommodation, instrumentation and "miscellaneous". Types of assistance least commonly obtained were use of technicians and referral to external sources of professional advice. The picture does not change greatly once these academic entrepreneurs' businesses were more established. Again, the types of assistance most commonly obtained were use of communications, use of accommodation, use of instrumentation - and equipment. Types of assistance least commonly obtained were use of technicians and any source of professional advice.

If we make a comparison across the four different universities, we find that initially academic entrepreneurs from York availed themselves of the most types of assistance, averaging 6.8 types of assistance per enterprise. Those at Liverpool averaged 6.5 types of assistance each, while those at Strathclyde averaged 5.9 types of assistance each. Those at Hull availed themselves the least, averaging 4.2 types of assistance each. Once the

businesses were established, it is clear that these academic entrepreneurs availed themselves of fewer types of assistance. Those at Liverpool averaged 4.1 types of assistance, those at York 3.8 types of assistance, those at Strathclyde 3.2 types of assistance and those at Hull just 3.2 types of assistance. If we compare the actual types of assistance they obtained, it is noticeable that academics at Hull were the only ones (not surprisingly) not to get in-house professional advice initially, while those at Strathclyde were the only ones to be referred to external sources of professional advice. It is even more noticeable that those at Strathclyde were the only academic entrepreneurs to get assistance with professional advice - in-house or referral to external sources - once the business was more established.

Academic Entrepreneurs' Attitude to the Role Played/Not Played by the University in Assisting Academic Entrepreneurs

The case-by-case analyses explored the attitude of the academic entrepreneurs to the role which their university had played - or not played - when they were setting up their business(es). The findings were summarised in Figure 252, which revealed that in 20 (59%) of the 34 instances detailed, the academic entrepreneurs had been satisfied. In three (9%) of the instances, the academic entrepreneurs had been only partially satisfied, while in eleven instances (33%) they had been dissatisfied to a greater or lesser degree. If we compare the satisfaction levels across all four cases, we find that 82 per cent of those from Strathclyde were entirely satisfied - the highest proportion, while only 29 per cent of those from Hull were satisfied - the lowest proportion. Where complete dissatisfaction was concerned, academic entrepreneurs from Liverpool exhibited the highest rate at 30 per cent, and those from York the least - ie none at all. Where slight dissatisfaction was concerned, though, those from York exhibited the highest incidence at 33 per cent, closely followed by those from Hull at 29 per cent, an additional 10 per cent from

Liverpool were slightly dissatisfied, too

The case-by-case analyses sought to establish why exactly certain academic entrepreneurs in each university were less than 100 per cent satisfied. The results were presented in Figures 253, 285, 300 and 315. If we make a comparison across all four cases, we see that of the ten categories, only two (financial profligacy, risk aversion) are replicated at all - and in both cases, they are replicated in only one other university. The remaining eight categories occur only once apiece - indeed, most of them contain only one "mention". This is not so surprising when we consider that we are focussing on only 14 instances of business start-up here - i.e. all those where the satisfaction level reported in Figure 252 was <5. Nonetheless, it is worth considering whether these are the most insightful categories. After examining the existing categories, the investigator concluded that it was possible to reduce the existing categories to seven without any need to force them; these categories were renamed, as was one of the existing categories. As Figure 348 shows, these particular academic entrepreneurs were dissatisfied with the role played by their university in helping set up their businesses on grounds of

- * financial misjudgement;
- * risk aversion,
- * approach to competency,
- * wimpishness;
- * lack of vision,
- * lack of transparency,
- and/or * lack of endorsement.

Judging by replication and the number of "mentions", financial misjudgement on the part of the university is by far the most robust category - six (38%) of the 16 grounds for

dissatisfaction cited fell into this category, which was replicated in three cases - **Liverpool, Strathclyde and York** Risk aversion would appear to be the next most robust three (19%) of the grounds cited fell into this category, which was replicated in two cases - **Hull and York** The last four categories (lack of vision, lack of transparency, lack of endorsement) all relate to grounds for dissatisfaction cited exclusively by academic entrepreneurs from **Hull**, while approach to competency encapsulates grounds for dissatisfaction cited exclusively by academic entrepreneurs from **Liverpool**

Of all the questions posed to these academic entrepreneurs, this particular question - "Were you satisfied with the role the university played in helping you set up your business?" - provoked a more passionate response than any other in the questionnaire - or, indeed, any other question posed spontaneously in the course of the discussion. It is clear from these categories and the grounds for dissatisfaction which they encapsulate that - in the main - these academic entrepreneurs were not dissatisfied with the provision of the types of physical and human assistance detailed immediately above. Only one of the above seven categories (approach to competency) is concerned with the provision of human assistance, and it is worth dwelling for a moment on this. As indicated above, all three grounds for dissatisfaction were cited by academic entrepreneurs from **Liverpool**. If we analyse the message they are collectively conveying, it is surely that the university was expected to provide comprehensive in-house professional advice - including marketing, that it was expected to deliver what it undertook to deliver, but that the academic entrepreneurs themselves should decide the extent to which they wished their hand to be held by the university. This is an interesting message for, if we refer back to chapters 7-9, we remember that this is precisely the message which **Strathclyde's** academics delivered during the late 1970s, the message which led to **Strathclyde** re-thinking its whole approach to academics with IP to exploit and concluding that a *laissez-faire* approach,

backed up by comprehensive in-house professional advice, was likely to be the most effective.

Finally, let us look at the other messages conveyed by these academic entrepreneurs. With the exception of grounds for dissatisfaction encapsulated in the category financial misjudgement, they are concerned with what we might call sins of omission, rather than sins of commission. Collectively they convey an image of universities which have a lack of vision, which are unduly risk averse, which are supine when it comes to asserting their rights *vis-a-vis* third parties - but which are no shirks when it comes to flexing their muscles *vis-a-vis* entrepreneurial members of staff, as the grounds for dissatisfaction encapsulated in the category financial misjudgement testify. These particular grounds for dissatisfaction convey an image of universities which are prone to greed, to imposing what are perceived to be onerous terms on academic entrepreneurs, but which are guilty of financial profligacy themselves - for which the academic entrepreneurs have had to pay the price. Furthermore, the last two categories convey an image of universities which have a tendency to sit on the fence, which fail to let academic entrepreneurs know how they really feel about their entrepreneurial activities, which may shirk from formally endorsing complex relationships between departments and entrepreneurial ventures. It is not the remit of this study to consider whether this collective view represents the objective truth, in so far as there is one, these findings are presented, like all the others in this subsection, because they provide insights into these academic entrepreneurs' attitudes and experiences.

11.7.5 Intellectual Property Rights

Licensing Situation

The case-by-case analyses addressed the question of whether academics exploiting IP via "hard" or "hard and soft" companies had obtained a license from their university. Figure 341 summarises the data in tabular form. From this we can see that although 25 (59%) of the 42 enterprises were either "hard" or a combination of "hard" and "soft" in character, only 7 (28%) of them had obtained a license. If we compare the figures for each university, it would appear, on the face of it, that Hull, Liverpool and York have been particularly lax about such questions.

Reasons For Not Having a License

The case-by-case analyses also addressed the question of why those academic entrepreneurs without licenses had not acquired one. The data were presented in Figures 255, 286, 301 and 316. For ease of comparison this is now summarised in tabular form in Figure 342. From this we can deduce that ten (50%) of the reasons given were that the university did not own the IP in question. Two (10%) of the reasons given were that the IP in question had been created in/licensed in from a third party, while one (5%) of the reasons given were that the IP was being exploited via the commercial arm of the department in question and a license was never considered by either the academics, the department or the university. Thus, judging by 13 (65%) of the 20 reasons given, the university concerned was not guilty of laxity. Judging by the other seven reasons given (35%), the universities concerned were very possibly lax when it came to explaining and enforcing their rights under UK intellectual property law. However, the commentary provided in the case-by-case analyses makes it clear that in some instances, the setting up of the company pre-dated the introduction of the university's IP policy; one might consider that the institutions concerned were dilatory when it came to formulating their

policy, but one cannot accuse these particular academic entrepreneurs of illegally exploiting the IP in question.

That is not to say that there were not academic entrepreneurs amongst the group of 25 who were not exploiting university-owned IP illegally. The case-by-case analyses revealed that two academic entrepreneurs from Liverpool were exploiting/had exploited IP which belonged to the university. In both instances, the academic entrepreneurs concerned had started off by setting up and running "soft" businesses - indeed, one still was. However, one "soft" business had transformed itself into a "hard" business over the years, and was busy exploiting "hard", licensable IP generated in the academic entrepreneurs' department. The other, the commercial arm of a department, had generated "hard" IP incidentally and omitted to bring it to the university's attention, even though the staff were university employees and therefore bound by the same rules as all other members of the academic staff.

11.7.6 Interaction with the Department

Sub-section 11.7.6 will focus on the interaction of these interviewees with their various departments. Since sub-section 11.7.4 has already shed light on the role (if any) played by the academic entrepreneurs' departments, as well as the centre, in making available equipment/instrumentation, accommodation, technical or secretarial support staff *etc*, this sub-section will concentrate on attitudes. These academic entrepreneurs' attitudes to the impact of their entrepreneurial activities on their academic commitments, their perceptions of their colleagues' and their HoD's attitudes to their entrepreneurial activities, and their attitude to their promotion prospects will be subjected to a cross-case analysis. In the main, the investigator has no means of checking the "truth" of these academic entrepreneurs' assertions, since no attempt was made to select for interview HoDs/Deans

who had academic entrepreneurs in their departments (There was no way of ascertaining this in advance without being forced to restrict the selection to the heads of departments in which informants from the administration knew there to be academic entrepreneurs - and as was made clear in chapter 6, the investigator was keen to interview entrepreneurial academics who were not sanctioned by the centre, who might have been operating clandestinely) However, the investigator does not regard this as problematical; the attitudes projected by the interviewees and their perceptions of colleagues' attitudes are of interest, no matter how divorced from reality their HoDs might conceivably regard them to be From the perspective of this study, the voice of these academic entrepreneurs is as of much interest as the voice of HoDs, Deans, policy-makers, policy-implementers and other informants from the centre

Impact of Entrepreneurial Activities on Academic Commitments

The case-by-case analyses established the views of the academic entrepreneurs from each university on the impact of their entrepreneurial activities on their academic commitments, if they still had any If we compare the categories proposed in Figures 267, 289, 304 and 319, we see that beneficial to teaching occurs in all four cases, while beneficial to research occurs in three of the four, and deleterious to teaching occurs in two. However, the other eight categories occur only once Once again this provokes the question: how should we interpret this? Do these academic entrepreneurs perceive genuinely diverse impacts or is it possible that the groupings and characterisations (*ie* the categories) proposed are not the most insightful or appropriate? The fact that two separate categories related to teaching have been identified (deleterious *versus* beneficial) suggested that there may be other, more insightful ways of grouping and characterising the impacts reported The 32 separate impacts cited were duly re-examined and it was found to be possible to group them into just seven new categories without any need to force them As Figure 343

shows, these particular academic entrepreneurs perceived their business activities to.

- * affect teaching,
 - * affect research,
 - * imbue transferrable skills,
 - * act as a distraction;
 - * promote the work of the department,
 - * affect learning;
- and/or * motivate

Two of these new categories (affect teaching, affect research) occur in all four cases, while another two (imbue transferrable skills, promote the work of the department) occur in two cases each. Only three categories (act as a distraction, affect learning and motivate) now occur in just one case. If we are prepared to accept these new categories as insightful, meaningful, appropriate and, where four are concerned at least, robust, what light do they shed on the views of these 25 academic entrepreneurs as a group on the impact of their business activities on their academic commitments? It would appear that the affect on teaching was perceived to be by far the most dominant impact, this was cited in 13 (42%) of the 31 instances. The impact was perceived to be largely beneficial, only three (23%) of the 13 examples were negative. The affect on research was the next most dominant, being cited in seven (23%) instances. However, two (29%) of the seven examples were negative. The perception that transferrable skills had been acquired was less common, being cited in just five (16%) instances, but in every instance this was seen as something positive. The other four categories of impact (promoting the work of the department, the affect on learning, motivation and acting as a distraction) were not commonly perceived, all four being cited in just six (19%) instances, only two (33%) of the examples given were negative.

In conclusion, then, three-quarters of these academic entrepreneurs felt that the impact of their business activities on their academic commitments was positive - and the benefit manifested itself in a variety of ways. Of course, it is not obvious from these new, aggregate categories whether there were marked differences in the views of academic entrepreneurs from the four universities. A check revealed that 83 per cent of the impacts cited by those from York were positive, while only 67 per cent of the impacts cited by those from Strathclyde were positive. Liverpool and Hull occupied the middle ground; of the impacts cited, 78 per cent and 75 per cent respectively were positive.

As an aside, it is worth noting before we leave this topic that some of these categories are particularly interesting in that, if careful attention is paid to the ordering of the sources of ideas, they have the capacity to illustrate very clearly various dimensions of the category in question. Let us take imbues transferrable skills as an example. Some interviewees saw these as very general skills which could benefit most aspects of their life, whereas others saw them as insightful in the more specific context of university administration/management and others again saw them as skills they could use in highly specific situations (*eg.* in Brussels, in running another enterprise). If we take affect research as another example, we find that some academic entrepreneurs focussed on the *funding* aspect of research, seeing the activities of their businesses as likely to stimulate an inflow of strategic or applied research funding to their departments. Others focussed on research *productivity* - *ie* greater or lesser productivity than if they were not in business. One saw this as a matter of pragmatism: he did more research and published more for the simple reason that he used the staff of his company as additional research assistants and was less dependent on the vagaries of external funding. Another was more concerned about the particular character of the research he did through his business, seeing it as leading to new theoretical insights which he could publish. However, another

felt that the demands of his business prevented him from getting round to publishing and a second assumed that he must be publishing less than he otherwise might, without actually having done any kind of reckoning. These are tantalising findings, for there is no way of deducing from this study whether this is simply a question of *perception* or whether the different circumstances in which the academic entrepreneurs found themselves genuinely imposed different constraints and opportunities. One wonders whether more academic entrepreneurs could harness the activities of their business in the service of their own academic life or the department's, or whether the dynamic of the business is often so compelling as to override such considerations.

Favours *Vis-a-Vis* Academic Commitments

The case-by-case analyses established whether the academic entrepreneurs from each university had sought favours *vis-a-vis* their academic commitments, if they still had any. The data were presented in Figure 268, and we can deduce from this that 80 per cent of the academic entrepreneurs from York had sought favours, while only 17 per cent of those from Hull had. The figures for those from Liverpool and Strathclyde are 38 per cent and 33 per cent respectively. Academic entrepreneurs from Hull and Strathclyde had sought only "formal" favours (*eg* part-time contracts, secondments), while one of those from Liverpool and two of those from York had sought informal favours of their colleagues and students, too.

It is probably pertinent to note that sooner or later four of the six academic entrepreneurs at Hull left the university, three to pursue their business activities on a full-time basis, and this may partly account for the markedly lower percentage. However, since two of the four continued as full-time academics for several years before leaving, we should not place too much emphasis on this. It may be more relevant to note that when responding to

this question, several of the academic entrepreneurs from Hull were sharply critical of the very notion of asking favours. One said "*Asking favours* is one of the things that is wrong with universities today". The academic entrepreneur whose disinterest in his academic duties led to the request for a part-time contract was also sharply self-critical, in retrospect. This may be a question of ethos, then, and it is possible that this was triggered or reinforced by the severity of the cuts imposed on Hull by the UGC in the early 1980s, not to mention the financial crisis of the mid-late 1980s, both of which have clearly reduced the potential for flexibility.

If we pursue this line of thought, we find that it may explain in part at least why such a large proportion of York's academic entrepreneurs felt able to ask for favours *vis-a-vis* their academic commitments - and informal favours, too, in two instances. If we refer back to Figure 2 we find that, with the exception of the London Business School which was given an increase in its recurrent Treasury grant, the percentage reduction in York's recurrent Treasury grant was less than any other UK university - and where the proportion of home/EC students was concerned, York was allowed to maintain the *status quo*. Moreover, in the course of this study the investigator was struck by the number of times interviewees from York used the words "flexible" or "flexibility". This would appear to be part of the ethos at York.

If we then look at Liverpool and Strathclyde, we remember that at the outset Liverpool was characterised by the investigator as one of the universities least afflicted by the UGC cuts, while Strathclyde was characterised as being treated neither particularly leniently nor particularly harshly by the UGC. Given that there is only a difference of 5 per cent in the percentage seeking favours, it is probably stretching a point to say that the cuts and their affect on ethos explain in part at least why a higher percentage of academic

entrepreneurs from Liverpool felt able to ask favours (However, we should remember that one of the two favours granted at Strathclyde was proposed by the Principal, not the academic entrepreneur) We would also have to ask ourselves why there is such a marked difference between the 80 per cent seeking favours at York and the 38 per cent seeking favours at Liverpool Of course, this could conceivably be explained by the fact that Liverpool experienced additional financial difficulties towards the end of the 1980s

The investigator would not wish to claim an association between the behaviour of the academic entrepreneurs in each institution, the cuts and the ethos of each institution - nor even to formally hypothesise that there is such an association She felt it was merely of interest to consider the possibility

Colleagues' Reactions to Their Entrepreneurial Activities

The case-by-case analyses established the perceptions of the academic entrepreneurs from each university regarding their colleagues' reactions to their entrepreneurial activities. If we compare the categories proposed in Figures 269, 290, 305 and 320, we see that of the thirteen categories, only one (jealousy) occurred in all four cases, while two (resentment, support) occurred in three cases and a further four (concern, inscrutability, neutrality, snide remarks) occurred in two cases The other seven (short-changing the university, Schadenfreude, disgust, qualified acceptance, acceptance, not known and pride) occurred in just one case apiece Yet again this provokes the question: how should we interpret this? Do these academic entrepreneurs perceive genuinely diverse reactions on the part of their colleagues or is it possible that the groupings and characterisations (*ie.* the categories) proposed are not the most insightful or appropriate? The fact that qualified acceptance and acceptance were treated as two separate categories, as were unknown quantity and inscrutability suggested that there may be other, more insightful ways of

grouping and characterising the impacts reported. The 38 separate reactions cited were duly re-examined and it was found to be possible to reduce them to ten categories without any need to force them. As Figure 344 shows, these particular academic entrepreneurs perceived their colleagues' reactions as

- * inscrutability;
 - * resentment,
 - * jealousy;
 - * qualified acceptance,
 - * support;
 - * snide comments,
 - * accusations of short-changing the university,
 - * concern,
 - * Schadenfreude,
- and/or * pride

It could doubtless be argued that these categories could be further reduced - eg. perhaps by combining snide comments with resentment, and/or Schadenfreude with snide comments or even jealousy etc. However, as indicated in the case-by-case analyses, it was felt that there are subtle but important differences between, say, jealousy, resentment, snide comments and Schadenfreude, and that there was no value in practicing reductionism for the sake of it. Thus, we still have a situation where only one category (jealousy) occurred in all four cases. However, three (resentment, inscrutability, support) occurred in three cases, another three (snide comments, qualified acceptance, concern) occurred in just two and the other three categories (short-changing the university, pride, Schadenfreude) occurred in just one case apiece.

So, what do these categories tell us about the reactions - or the *perceived* reactions - of these 25 academic entrepreneurs' colleagues? One of the most interesting things to come out of this analysis is that eight (32%) of the 25 did not really know what their colleagues thought about their business activities, because the subject was not openly discussed with the academic entrepreneurs themselves. Seven (28%) of the 25 perceived their colleagues to resent their business activities for one reason or another. Five (20%) perceived their colleagues to be jealous of their business activities. Another five (20%) felt there was qualified acceptance for their business activities, while four (16%) felt their colleagues actually supported what they were doing, and one (4%) even felt they were proud of what the academic entrepreneurs had achieved. However, two (8%) felt their activities had occasioned concern, two (8%) had been accused of short-changing the university, three (12%) claimed they had been subjected to snide comments and one (4%) felt that his colleagues hoped he would fail. If we classify short-changing the university, jealousy, resentment, snide comments, Schadenfreude and concern as negative, inscrutability and qualified acceptance as neutral and support and pride as positive, then 53 per cent of the reactions attributed to their colleagues by this particular group of academic entrepreneurs were negative, 34 per cent were neutral and just 13 per cent were positive.

We now need to consider whether there were marked variations between the perceived reactions of colleagues in the four universities. It was noticeable that the average number of reactions cited by the interviewees varied from one university to the next. Interviewees at Hull cited 1.8 reactions each, while those at Liverpool cited 1.5 each, those at York 1.4 each and those at Strathclyde just 1.3 each. This suggests that academic entrepreneurs at Strathclyde may have felt slightly less need than their *confreres* at Hull to give vent to their perceptions of their colleagues' reactions, but the difference is fairly marginal. Further, the highest percentage of negative reactions were reported by academic

entrepreneurs from Strathclyde (63%) and the lowest percentage (29%) were reported by those from York. The figures for Hull and Liverpool were 55 per cent and 58 per cent respectively. The highest percentage of neutral reactions were reported by academic entrepreneurs from Liverpool (33%), while the lowest percentage were reported by those from Strathclyde (0%), the figures for Hull and York were 18 per cent and 29 per cent respectively. Finally, the highest percentage of positive reactions were reported by academic entrepreneurs from York (43%), while the lowest percentage were reported by those Liverpool. The figures for Hull and Strathclyde were 27 per cent and 38 per cent respectively. These findings testify to a certain diversity in the reactions attributed to colleagues in each institution. It is difficult to know whether this diversity reflects genuine differences between departments, or differences in the *perceptions* of the academic entrepreneurs concerned. If this small sample, which makes no claims to be representative, is, in fact, at all representative, it would also seem that, although the Principal at Strathclyde may have embraced the enterprise culture, some of his staff remained to be convinced, while staff at universities with less of a determinedly "entrepreneurial" ethos were less bothered by the activities of academic entrepreneurs.

As an aside, it is worth noting before we leave this topic that some of these categories are particularly interesting in that, if careful attention is paid to the ordering of the reactions within them, they have the capacity to illustrate very clearly different dimensions of the same broad topic. Let us take the category inscrutability, for instance. It is evident from this category that some academic entrepreneurs felt that their colleagues were guilty of a studied lack of openness towards them (see, eg. "*There was never any discussion and it was difficult to deduce what people thought about it*"), while others adopted no particular position on this (see, eg. "*Fellow members of staff portrayed themselves as neutral*") and others again felt that they themselves were at least partially responsible for this state of

affairs (see, eg. "It is not easy to deduce what they were thinking, but then I was always a loner; I didn't go to coffee with the rest of them"). If we examine resentment, we find that some colleagues appeared to be exercised by the fact that academic entrepreneurs were metaphorically turning their back on the one true religion, academia, were turning their face towards Mecca, in the shape of industry and commerce. Others seemed to be exercised by the fact that the academic entrepreneur's activities represented a net cost to the department, while others again were upset that the department was not getting its hands on the income being generated

HoD's Reaction to Their Entrepreneurial Activities

The case-by-case analyses established the perceptions of the academic entrepreneurs from each university regarding their HoDs' reactions to their entrepreneurial activities. The data elicited from all those who were not themselves HoD at the time were presented in Figure 270. We can deduce from the totals that in 15 (52%) of the 29 instances under consideration here, the academic entrepreneurs felt that their HoDs had been supportive, whereas in eight (28%) of the instances, they felt they had been merely neutral. In only three (10%) of the instances were the HoDs felt to have been positively antipathetic from the outset; however, in another two instances (7%) they were felt to have changed from supportive to antipathetic; one subsequently became neutral, however

It is evident from Figure 270, though, that HoDs in some of the four universities were perceived to have been markedly more supportive than in others. It would appear that HoDs at York had been supportive in six (86%) of the seven instances, whereas HoDs at Hull had been supportive in only one (33%) of the three instances. The figures for Liverpool and Strathclyde were 36 per cent and 50 per cent respectively

CHAPTER 12

12 DEVELOPING HYPOTHESES AND THEORY

12.1 Introduction

Chapters 7-11 have concentrated on this investigation's two primary aims. It is now time to focus on its secondary aim - viz to see whether it is possible to begin to develop substantive theory in relation to these universities' approach to managing the exploitation of IP. In grounded research, theory is built up using the building bricks of hypotheses which are derived from the data elicited - or rather from the analysis of those data. Care should be exercised with regard to the selection of these hypotheses, hypotheses should not be formulated where findings are open to a number of interpretations or where significant quantities of data are missing.

12.2 Giving Academics the Fullest Opportunity and Scope to Exploit Their Findings and Ideas

(i) Ownership of IP

The cross-case analysis conducted in chapter 7 established that none of the nine universities gave members of their academic staff the fullest opportunity and scope to exploit their findings and ideas. It established that there was a "mechanistic" reason for this - viz none of them routinely waived or assigned their rights in IP in favour of the academic(s) who generated it. In connection with this, it established that four of the nine universities - City, Glasgow, Liverpool and Strathclyde - had already determined their policy on the ownership of IP some years before Sir John Kingman's letter and the statement from the DES arrived, only one - City - revisited this question some time after receiving these two documents, but decided to make no change. Further, two of the nine - Durham and Hull - were in the process of formulating their first IP policy when Sir John Kingman's letter and the DES statement arrived. Neither opted to routinely waive their rights in IP in favour of the academic(s) who generated it, Hull preferred to be influenced

by the CVCP's 1978 report, while Durham preferred to take an *ad hoc* approach to the question of ownership, notwithstanding the fact that it had consulted both the CVCP's 1978 report, Sir John Kingman's letter and the DES statement. Finally, three universities - Bristol, Kent and York - did not start formulating an IP policy until the late 1980s, at which time Hull extended its IP policy to take in software and other forms of IP. York and Hull preferred to be influenced in their decision on the ownership of IP by UDIL's 1988 report, and Bristol and Kent's IP policy bear its hallmark, too.

It is tempting to conclude that these universities were more influenced by documents such as the CVCP's 1978 report and UDIL's 1988 report because each expressed an unequivocal view on the ownership of IP - albeit a different view. This contrasted with the views propounded in 1985 by the Research Councils, the DES and the Government. As chapter 5 noted, the CVCP was concerned in 1985 about the tensions between the wishes of the various interest groups: the Research Councils apparently wished the rights and responsibilities for exploitation to rest firmly with the institution in receipt of the grant, while the Government was encouraging universities to give academics those rights and responsibilities, the DES seemed to tread a middle path, urging universities to give academics the right of first refusal when it came to exploiting their research discoveries. However, no evidence was elicited in the course of the fieldwork to suggest that policy-making groups had *consciously* been confused or deterred by these mixed messages and therefore preferred to be influenced by an unequivocal message. Nor was any evidence elicited which suggested that universities *consciously* decided that they preferred to be influenced by reports produced by organisations composed of members of universities (*ie* the CVCP and UDIL), rather than outsiders (*ie* the Research Councils, the DES, the Government). It seems most likely that the procedures which the CVCP's 1978 report recommended should be put in place suited universities' purposes, as did the policy on

ownership which UDIL's 1988 report recommended - *ie* they perceived their purposes to be served by asserting control over the exploitation of IP generated by members of the academic staff. In the two universities which formally adopted the CVCP's 1978 recommendations more or less verbatim, the joint ownership conferred by the policy was eventually translated into asserting sole ownership of IP generated by members of the academic staff - though it was not possible to establish exactly when or how this came about. Similarly, although Durham's policy-makers opted to make an *ad hoc* decision about ownership, ownership has always been vested in the university. This approach on the part of these universities did not necessarily preclude them from allowing - or, indeed, even encouraging - academics in turn to assume responsibility for the exploitation of their findings and ideas; it simply ensured that they controlled the overall extent to which this happened and the specific instances in which it happened.

This analysis suggests the following, related hypotheses

- 1) *if universities do not give members of their academic staff the fullest opportunity and scope to exploit their findings and ideas, then mechanistically this will be because they do not routinely waive or assign their rights in IP in favour of the academic(s) who generate it,*
- 2) *if universities formulated their policy on the ownership of IP prior to May 1985, then they will not have been persuaded by these documents to change their policy,*
- 3) *if universities had no policy on IP ownership when Sir John Kingman's letter and the DES statement arrived, then they will have been influenced more by other documents - viz the CVCP's 1978 report or UDIL's 1988 report - rather than by these two documents*

We might theorise, then, that universities' approach to the ownership of IP is determined by what they believe suits their own purposes - and that most perceive their purposes to be served by the control achieved through asserting ownership of IP generated by members of staff, no matter what their policy actually says

(ii) Concessions

The cross-case analysis established that Strathclyde and York came very close to giving members of their academic staff the fullest opportunity and scope to exploit their findings - on the basis of concessions which were not formally articulated. It also established that this was not because Sir John Kingman's letter hinted at it, the DES wished it and the ESG extracted a commitment from each university to do so. Strathclyde decided upon this approach as a means of rectifying its earlier policy which proved counterproductive, while York arrived at this approach by default rather than by design.

This analysis suggested the following, related hypotheses:

- 4) *if universities, by virtue of concessions, come close to giving members of their academic staff the fullest opportunity and scope to exploit their findings and ideas, then they do not do so because Sir John Kingman's letter hinted at it, the DES statement wished it and the ESG extracted a commitment from them to do so,***
- 5) *if a university decides upon this approach, then it is because it feels it is appropriate to its own particular situation,***
- 6) *that a university may arrive at this situation by default, rather than by design***

(iii) Limited or Zero Concessions

The cross-case analysis established that the universities which came less close - or not at all close - to giving members of their academic staff the fullest opportunity and scope to exploit their findings and ideas arrived at this approach by a number of different routes. In City it was a matter of policy, motivated largely by a desire for the university to have at least as much control over the exploitation process as the academics concerned, so that the academics did not inadvertently disadvantage either themselves, their department or the university, since the policy-maker and the policy-implementer were one and the same person at City, there was no conflict between policy and the manner of its implementation. In Durham, it was a matter of policy, motivated almost entirely by a desire to avoid risk; however, the cross-case analysis suggested that in practice the policy-implementer may adopt a less flexible approach than the policy-makers intended. In Glasgow it was largely a matter of policy, motivated by a desire for the university not to be cut out of the exploitation process, as it used to be, and for the IP not to be squandered commercially, however, the *modus operandi* of the policy-implementer also played a part. In Hull and Liverpool, as we have seen, it was policy for academics to be given joint ownership of IP - and therefore decision-making rights which were equal to the university's, however, this was not enacted in practice. In Hull, there was no standing policy-making group to monitor the policy-implementer's approach - and in any case, there is no evidence that the policy-making group which voted to adopt more or less *verbatim* the policy recommended by the CVCP's 1978 report was aware that it had committed the university to joint ownership and therefore to decision-making rights which were equal to the university's. As chapter 5 indicated, certain aspects of the policy recommended in the CVCP's 1978 report conflicted with the joint ownership which the policy advocated, it seems likely that Hull's policy-making group focussed on those aspects of the CVCP's recommendations which appeared to give the university control over the decision-making processes. In

Liverpool, too, members of the very senior group which seems to have informally assumed responsibility for policy are either unaware of the terms of their institutional policy - or they have chosen to ignore it. As a result, the guidelines formulated for the policy-implementers at Liverpool also conflicted with the joint ownership which the policy prescribed. However, the policy-implementers seemed unaware of this conflict. In Bristol there was very little in the way of policy, with the result that Bristol's approach was determined largely by the policy-implementer, the policy-implementer could find no copy of Sir John Kingman's letter or the DES statement on file and made no effort to obtain a copy. At Kent, there was no formal policy at all, a series of policy-implementers had made *ad hoc* decisions based on their own idiosyncratic view of the appropriate *modus operandi*.

This analysis suggested the following, related hypotheses

- 7) *that the majority of universities comes not very - or not at all - close to giving members of their academic staff the fullest opportunity and scope to exploit their findings and ideas,*
- 8) *that these universities arrive at this approach by a number of different routes,*
- 9) *that in a minority of universities it is policy-makers alone who determine the fact that the university comes not very - or not at all - close to giving members of its academic staff opportunity and scope to exploit their findings and ideas,*
- 10) *that these particular policy-makers are usually against the idea of giving academics the fullest opportunity and scope to exploit their research findings and ideas on grounds of risk and/or control,*

- 11) *that in a minority of universities it is the policy-implementer alone who determines the fact that the university comes not very - or not at all - close to giving members of its academic staff opportunity and scope to exploit their findings and ideas;*
- 12) *that the majority of universities comes not very - or not at all - close to giving members of its academic staff opportunity and scope to exploit their findings and ideas because the modus operandi of policy-implementers exacerbates limitations imposed by policy-makers.*

(iv) Monitoring

The cross-case analysis established that the nine universities' approach to policy-making varied considerably. Only four universities - City, Glasgow, Strathclyde and ostensibly Kent - had a formally recognised standing policy-maker/policy-making group. The other five - Durham, Hull, Liverpool, York and ostensibly Bristol - had an *ad hoc* policy-making group which, was wound up once it was felt that the job had been done. Liverpool constituted an exception to this rule in so far as the university's Research Committee continued to operate, but there is no evidence that it formally addressed the question of the institution's IP policy again, meanwhile, the senior management group seemed to assume periodic responsibility for IP policy, but this did not appear to have been formally acknowledged. The cross-case analysis established *en passant* that as a result of Durham, Hull, Liverpool, York, Bristol and Kent having either no formally recognised, standing policy-maker/policy-making group - or none that was active, these universities were in no position to monitor either the effectiveness of their policy or the way in which the policy-implementer(s) went about implementing it. All six were therefore reliant on the policy-implementer alerting them to changes which might be required. Since by and large the policy-implementers in these universities held views which were not sympathetic to the

idea of giving academics the fullest opportunity and scope to exploit their research findings and ideas, we can see at once that there is little or no opportunity for the impact of the policy-implementer's *modus operandi* on the role of the academic to be recognised, let alone evaluated and moderated. This analysis suggested the following related hypotheses:

- 13) *that the majority of universities does not have a standing policy-maker/group of policy-makers who can monitor the policy-implementer's modus operandi;*
- 14) *that as a result, the impact of the policy-implementer's modus operandi on the extent to which academics are given opportunity and scope to exploit their research findings and ideas will not be recognised by the university, let alone evaluated and moderated*

12.3 Encouraging Academics to Assume Responsibility for Exploiting Their Findings and Ideas

(i) Disseminating Information

The cross-case analysis conducted in chapter 8 established that none of the nine universities had told existing or new staff about the Government's wish that academics should be given the fullest opportunity and scope to assume responsibility for exploiting their findings and ideas, let alone reminded them. In the light of the hypotheses formulated and the conclusions drawn in section 12.2, this is not surprising. However, there is no principled reason why the nine universities should not have told existing staff about the removal of the BTG's monopoly, the Research Councils' offer and the university's assumption of rights and responsibilities previously enjoyed by the BTG, nor is there any principled reason why new staff should not have been told about the university's assumption of these rights and responsibilities, or all staff reminded of these

events from time to time

It is interesting to note that all the minimum performance requirements laid down for the purposes of evaluating these universities were constructed purely on a theoretical basis, with no reference at all to the data. Nonetheless, if we refer back to measures 8.1 to 8.8, for example, we find that - if we exclude measures (d), (f) and (h), which relate to publicising the Government's wishes with regard to the role of the academic in the exploitation process - at least one university met the minimum requirements laid down for the purposes of evaluations 8.1 to 8.7, in some instances, two, three or four universities met the minimum requirements, and in one instance, two universities actually exceeded the minimum requirement laid down. This indicates that these requirements were not excessive.

The cross-case analysis conducted in chapter 8 established that the nine universities' performance with regard to disseminating information about the removal of the BTG's monopoly, the Research Councils' offer and the university's assumption of rights and responsibilities previously enjoyed by the BTG differed widely. If we adjust the overall score given at the end of section 2 of chapter 8 to take account of the fact that none of the nine disseminated information about the Government's wish concerning the role of the academic in the exploitation process, there is still wide variation. Liverpool scored the highest at 84 per cent, while Kent scored the lowest at 19 per cent. Just two universities came relatively close to meeting the minimum performance laid down for the purposes of this evaluation.

The discussion at the end of chapter 8 established that in universities which were dilatory about publicising the removal of the BTG's monopoly and the Research Councils' offer, it

was usually senior administrators/policy-makers who were responsible for this. In universities which were dilatory about publicising the university's assumption of rights and responsibilities previously enjoyed by the BTG, chapter 8 established that it was difficult to know whether to lay the blame at the policy-makers' or the policy-implementers' doors, and that a lack of communication between the two was the most likely explanation. Ensuring that new staff were given this information and that all staff were reminded from time to time was deemed to be policy-implementers' responsibility. However, chapter 8 established that disseminating "ongoing" information may be beyond the control of the policy-implementer if it entails using the staff handbook as a vehicle or creating/reissuing a research handbook as the vehicle

This analysis suggests the following, related hypotheses:

- 15) *that in relation to disseminating information about the removal of the BTG's monopoly, the Research Councils' offer and the university's assumption of rights and responsibilities previously enjoyed by the BTG, universities' performance differs widely;*
- 16) *that policy-makers were responsible for universities being dilatory about disseminating information on the first two events;*
- 17) *that inadequate communication between policy-makers and policy-implementers was responsible for universities being dilatory about disseminating information on the latter event;*
- 18) *that issuing "ongoing" as opposed to "trigger" reminders will be beyond the control of some policy-implementers*

(ii) Response to External Policy Initiatives

The cross-case analysis established that the nine universities' performance for timeliness in issuing an IP policy statement and the content of their IP policy statement was neither uniform nor adequate, as defined for the purposes of this investigation. It established that the most of the variation in performance resulted from the fact that five of the nine universities had not issued an IP policy statement. However, in two cases - Liverpool and Hull - it also resulted from the fact that the content of the IP policy statement which was issued had a negative rather than a positive or a neutral effect in terms of the government's wish concerning the role of the researcher in the exploitation process. In view of the position of these two universities in the rank order detailed in section 3 of chapter 7, and in view of the hypotheses formulated and the conclusions drawn in section 12.2, it is not particularly surprising that the content of these two policy statements should not have a positive effect, however, in view of these universities' commitments to the ESG concerning the role of the researcher in the exploitation process, it is surprising that their policy statements should have a negative rather than a neutral effect. This is particularly surprising in the case of Hull, which formulated its policy after the arrival of Sir John Kingman's letter and the DES statement. Chapter 8 also established that both universities had adopted the CVCP's 1978 policy recommendations more or less *verbatim*. This analysis suggested the following hypothesis:

- 19) *that if a university adopted the CVCP's 1978 policy recommendations more or less verbatim and made no change following receipt of Sir John Kingman's letter and the DES statement, then their policy statement will have had a negative rather than a positive or a neutral impact in terms of the government's wish concerning the role of the academic in the exploitation process, notwithstanding these universities' commitment to the ESG*

The fact that these universities were not enamoured of the Government's wish *vis-a-vis* the role of the academic in the exploitation process should not prevent them from issuing an IP policy statement. However, as we have seen, four of the nine universities had not issued an IP policy statement between 1985 and 1990. The discussion at the end of chapter 8 established that in the case of Strathclyde, this was deliberate, rather than an oversight. In the other three universities, however, it seems more likely to have been an oversight. There were grounds for supposing that, with the exception of Strathclyde, the relationship between policy-implementers and policy-makers (in so far as there were any) was inadequate in the universities which had issued no policy statement - inadequate because the policy-makers either no longer existed as a group or because the group was completely inactive.

This analysis led to the following hypothesis.

- 20) *that if a university issued no IP policy statement between 1986 and 1990, then the relationship between policy-implementer and policy-maker(s) is liable to have been inadequate or non-existent*

The cross-case analysis conducted in chapter 8 also established considerable variation in the nine universities' performance in relation to signalling their moral and practical support for academics assuming responsibility for exploiting their discoveries by creating and publicising appropriate frameworks/structures. The discussion at the end of chapter 8 attempted to uncover the reasons for this variation. It revealed that it was not the size of the university or its science base or the severity of the cuts imposed in 1981 or the amount of research grant and contract income *etc* which determined whether a university set up an IL/IP office, it was the university's *expectations* concerning the likely yield of its research grant and contract income in terms of commercial exploitability. Moreover, two of the

four universities with no IL/IP office reported that they had experienced a critical incident in relation to marketing the university's expertise and facilities. It also revealed that the impetus for a holding company came from quite different sources in the four universities which had set one up. Further, it revealed that Durham was doubtful about the concept of joint ventures because it was so concerned about putting itself or its IP at risk. It also revealed significant differences between the other eight universities, five were doubtful about proposing a joint venture to members of the academic staff, preferring to let the initiative come from those who felt they could take on the extra work, three had no qualms about suggesting a joint venture, however. It was felt that this analysis was of limited value where the formulation of hypotheses is concerned, the processes underlying the facts established in Evaluations 8 12 to 8 16 were, on the whole, singular rather than recurring.

Where publicity in relation to these frameworks/structures was concerned, the cross-case analysis established wide variation in the nine universities' performance. The discussion at the end of chapter 8 revealed that there was no reason to suppose that newsletters in any of the nine universities were not a suitable vehicle for publicity of this sort. It also revealed that the geographic proximity of the ILO and the newsletter editor was not in itself sufficient to explain the variation in the performance of these universities - and that Glasgow's winning performance with regard to publicity of this sort was the result of a conscious decision to cultivate a close relationship between the newsletter editor and the policy-implementer. Finally, it revealed that some universities felt that there were constraints on certain types of publicity - most notably certain license deals, the concept of joint ventures or university companies (lest academics interpret this as the university putting pressure on them), and financial details pertaining to actual joint ventures or university companies (lest fellow, non-entrepreneurial academics become jealous).

This analysis suggested the following, related hypotheses

- 21) *that in relation to publicising the creation and ongoing activities of such frameworks/structures as they have which signal moral and practical support for academics assuming responsibility for exploiting their IP, universities' performance varies markedly,*
- 22) *that there will be a relationship between a university's performance in this respect and the extent to which a conscious decision has been taken to cultivate a close relationship between the policy-implementer and the newsletter editor,*
- 23) *that some universities feel they should publicise neither the concept nor actual examples of university companies or joint ventures, for fear of the academic community reacting negatively*

(iii) Incentives

The cross-case analysis established that if eight of the nine universities were scored for consistent generosity in the share of the income (banded from £1-£1m) which they gave to academics whose IP was successfully exploited, their performance differed widely. One of Hull's three formulae was the most generous, scoring 81 per cent for consistent generosity, while another was the second least generous, scoring only 37 per cent Kent was the least generous of all, scoring only 19 per cent In almost every income band, the eight universities gave academics a less generous proportion of the income than was suggested by either the CVCP or the AUT It was not possible to discover exactly how all the universities arrived at the formulae they employed, though it is known that the AUT were heavily involved in discussions at Hull and at York, and that the AUT at York felt that its efforts were responsible for one of the most generous formulae in the UK. In City, in contrast, it was the Secretary who decided that the university should reward academics

generously. At Glasgow, it was the policy-makers who decided that academics should get a relatively generous share of the income from IP. At Bristol, it was the ILO who persuaded the university to increase the relatively stingy proportion which the university had allowed academics in the wake of the 1981 cuts. At Kent it was the Finance Committee which decided on the least generous share of at least eight of the participating universities

This analysis suggested the following, related hypotheses

- 24) *that, measured in terms of consistent generosity in relation to the share of the income (banded from £1-£1m) which they give to academics whose IP is successfully exploited, universities' performance differs widely.*
- 25) *that universities which are relatively generous have usually taken a conscious decision that it is counter-productive to be stingy,*
- 26) *that, nonetheless, in almost every income band, the average share of the income given by any group of universities to academics whose IP is successfully exploited will be less generous than the share suggested by either the CVCP or the AUT.*

The cross-case analysis also established that if eight of the nine universities were scored for consistent generosity in the share of the income (banded from £1-£1m) which they gave to the departments of academics whose IP was successfully exploited, their performance differed very widely indeed. Kent was the only university not to share the income from the exploitation of IP with departments. All three of Hull's formulae were consistently the most generous to the department, scoring 97, 81 and 66 per cent respectively, while Strathclyde's formula was the least generous, scoring just 21 per cent. No connection between performance and university type or objective factors such as

university size, size of the science base, the severity of the 1981 cuts *etc* was found.

This suggested the following hypothesis

- 27) *that, measured in terms of consistent generosity in the share of the income (banded from £1-£1m) which they give to the departments of academics whose IP was successfully exploited, universities' performance will differ very widely*

Finally, the cross-case analysis established significant variation in the nine universities' performance in relation to the speed and thoroughness with which they disseminated details of the financial rewards to existing and new staff following authorisation from the Research Councils and in their performance in relation to the prominence of the information disseminated to new staff. None of the nine satisfied the minimum performance laid down for the purposes of this study. City came closest, scoring 88 per cent, while Kent could not be considered to have performed at all, scoring 0 per cent. No connection between performance and university type or objective factors such as university size, size of the science base, the severity of the cuts *etc* was found. This suggested the following hypothesis

- 28) *that there is significant variation in universities' performance in relation to the speed and thoroughness with which they disseminated details of the financial rewards to existing and new staff following authorisation from the Research Councils and in their performance in relation to the prominence of the information disseminated to new staff*

12.4 Providing Guidance and Help

(i) Guidance in Relation to the Implications of Premature Disclosure

The cross-case analysis conducted in chapter 9 established marked variation in the nine universities' performance in relation to the contexts, media and agents employed to disseminate information on the implications of premature disclosure, in relation to the targets of the information and in relation to the length of time this guidance had been provided. While one university exceeded the minimum performance laid down for the purposes of this study, only one other came close to achieving it; five scored between 15 and 54 per cent. The cross-case analysis also established that the scores achieved by the nine strongly suggested that none of them had thought very analytically about how they communicate this information to the academic community, and that they tended to get stuck in one "mind-set", using the same, limited tactics year after year.

This analysis suggested the following, related hypotheses

- 29) *that there is marked variation in the nine universities' performance in relation to the contexts, media and agents employed to disseminate information on the implications of premature disclosure, in relation to the targets of the information and in relation to the length of time this guidance has been provided*
- 30) *that universities do not think very analytically about how they communicate this information to the academic community,*
- 31) *that universities tend to get stuck in one "mind-set", using the same, limited tactics year after year.*

(ii) Guidance in Relation to Evaluating IP

The cross-case analysis established that policy-implementers from all nine universities grasped the need for a technical and a market evaluation, but nearly half did not seem to grasp the need for a scientific evaluation. It also established that although policy-implementers generally communicated to academics with potentially exploitable IP the need for a technical and a market evaluation, only three of the five who recognised the need for a scientific communicated this to the academics concerned. Further, it established that with the exception of Strathclyde, academics themselves are not generally allowed to assume responsibility for the formal evaluation of their IP, let alone encouraged. As far as could be determined, with the exception of Strathclyde, where this was a matter of policy, this was simply the policy-implementer's chosen *modus operandi*

This suggested the following, related hypotheses:

- 32) *that policy-implementers grasp the need for a technical and a market evaluation, but not necessarily the need for a scientific evaluation,*
- 33) *that policy-implementers generally communicate to academics with potentially exploitable IP their understanding of what is needed on an in principle basis;*
- 34) *that in practice most policy-implementers expect academics to rely on them to obtain the requisite forms of evaluation and are unwilling to teach academics how to obtain them*

(iii) Guidance in Relation to Protecting IP

The cross-case analysis established marked variation in the nine universities' performance in relation to the guidance they provided *vis-a-vis* to different types of IP and how each may be protected, in relation to the procedures and costs entailed in the different types of

protection, in relation to the conventions of drafting patent/design specifications and in relation to the length of time this guidance had been provided. This variation pertained chiefly to the provision of information about the conventions of drafting patent/design specifications. A relatively poor performance was associated with a lack of/a relatively low level of funding to cover the cost of bringing in a patent agent to provide this information

This analysis suggested the following, related hypotheses:

- 35) *that there is a marked variation in universities' performance in relation to the guidance they provide vis-a-vis to different types of IP and how each may be protected, in relation to the procedures and costs entailed in the different types of protection, in relation to the conventions of drafting patent/design specifications and in relation to the length of time this guidance has been provided*
- 36) *that the greatest variation pertains to the provision of information about the conventions of drafting patent/design specifications,*
- 37) *that a poor performance in this respect is associated with a lack of/a relatively low level of funding to cover the cost of bringing in a patent agent.*

(iv) **Guidance in Relation to Locating Potential Licensees/Assignees**

The cross-case analysis established variation in the nine universities' performance in relation to the range of techniques employed by policy-implementers to locate potential licensees/assignees. It also established that in City, Durham and Hull, all the techniques employed would probably have been known to academics already, while in Liverpool and Strathclyde, most of the techniques employed would probably have been familiar to them.

It was only at Bristol, Glasgow and York that the policy-implementer employed techniques which would probably have been novel or fairly novel to academics. This suggested the following, related hypotheses.

38) *that the range of techniques employed by policy-implementers to locate potential licensees/assignees varies considerably from one university to the next;*

39) *that most of the techniques employed by most policy-implementers will probably be known already to academics from science and technology disciplines*

(v) **Guidance in Relation to Approaching Potential Licensees/Assignees**

The cross-case analysis established a marked variation in the nine universities' performance in relation to *in principle* guidance with regard to approaching potential licensees/assignees, in relation to guiding academics to translate principle into *practice*, and in relation to the length of time both forms of guidance had been provided. While Strathclyde achieved the minimum performance laid down for the purposes of this investigation, the other eight scored between 30 and 50 per cent. It also established that most of this variation in performance was due to the fact that in every university except Strathclyde, academics were expected to use the confidentiality agreement which they had drawn up - or to have it modified to suit individual circumstances in accordance with their wishes. It was not clear whether this was a matter of policy or simply the policy-implementer's *modus operandi*.

This suggested the following related hypotheses.

40) *that policy-implementers give academics in-principle guidance in relation to approaching potential licensees/assignees,*

- 41) *that in practice most policy-implementers expect academics to rely on their expertise at drawing up/modifying confidentiality agreements, and do not help them develop their own.*

(vi) **Guidance in Relation to Writing Business Plans**

The cross-case analysis established variation in the nine universities' performance in relation to the guidance provided in-house with regard to writing business plans or through referral to external sources of guidance, in relation to the conditionality with which guidance/referral was provided and in terms of the length of time guidance/referral had been provided. It also established that most of the variation was occasioned by the length of time these forms of guidance/referral had been provided. In only two cases was it occasioned by the conditionality with which the guidance was provided - and in both cases this was the policy-implementer's *modus operandi*, rather than policy

This analysis suggested the following, related hypotheses:

- 42) *that universities try to ensure that would-be academic entrepreneurs get guidance in relation to writing business plans,*
- 43) *that a minority of universities does not extend this form of guidance/referral to academics wishing to start up independent academic spin-off companies,*
- 44) *that it is the policy-implementer rather than the policy-makers who impose this conditionality*

(vii) **Guidance in Relation to Other Aspects of Business Start-Up**

The cross-case analysis established the most marked variation in the nine universities' performance in relation to the guidance provided in-house or through referral to external

sources with regard to other aspects of business start-up, in relation to the conditionality with which guidance/referral was provided and in terms of the length of time these forms of guidance/referral had been provided. Whereas Strathclyde scored 100, Durham scored 0, the other seven universities achieved a wide range of scores between 22 per cent and 75 per cent. It established, too, that where guidance *in principle* was concerned, the variation was due to timing in one or two cases - but usually reflected a marked difference in attitude, the attitude in question was usually the policy-implementer's. It also established that few universities were consistent about translating principle into practice. This analysis suggested the following, related hypotheses

- 45) *that universities' attitudes to providing guidance or referring staff to external sources of guidance in relation to other aspects of business start-up differ widely,*
- 46) *that in universities which impose conditions on who is given guidance of this nature, it is the policy-implementer rather than the policy-makers who impose those conditions.*

(viii) **Help in Relation to Funding the Cost of a Patent Agent**

The cross-case analysis established marked variation in the nine universities' performance in relation to their preparedness to fund the cost of a patent agent to advise whether a discovery conforms to the criteria laid down by UK intellectual property law for the form(s) of protection indicated and to draft/help draft patent/registered design specifications, and in relation to the length of time these forms of help had been provided. Five universities achieved the minimum performance laid down for the purposes of this investigation. However, of the other four one scored just 3 per cent and two just 50 per cent, while the fourth scored 70 per cent. The cross-case analysis established that most of the variation in these scores was occasioned by universities skimping on the use of patent

agents to draft patent specifications. It also established that this was a direct result of the level of funding, if any, made available to the policy-implementer by the university. It was concluded that the most likely effect was that universities which skimmed on the use of patent agents were jeopardising the strength of the protection afforded to inventions/designs generated by members of the academic staff. This analysis suggested the following, related hypotheses

47) *that a significant proportion of universities skimps on the use of patent agents to draft patent/design specifications, thereby risking jeopardising the strength of the "protection" afforded to inventions/designs generated by members of staff*

48) *that skimping on the use of patent agents in this way is a direct result of the level of funding, if any, made available to the policy-implementer for this purpose*

(ix) **Help in Relation to Funding Expert and Independent Evaluation of Potentially Exploitable IP**

The cross-case analysis established significant variation in the nine universities' performance in relation to their preparedness to fund expert and independent evaluation of potentially exploitable IP when required, and in relation to the length of time they had provided this form of help. Only Glasgow achieved the minimum laid down for the purposes of this investigation. Four universities did not provide any help at all in this respect, while the remaining four provided this form of help on a very occasional basis. It was established that universities' performance in this respect was usually, though not always, a direct result of the level of funding, if any, made available to the policy-implementer for this purpose.

This analysis suggested the following hypothesis:

49) *that a tiny minority of universities is prepared to regularly fund expert and independent evaluation of potentially exploitable IP.*

(x) **Help in Relation to Funding the Cost of Acquiring and Maintaining Patents and Registered Designs**

The cross-case analysis established marked variation in the nine universities' performance in relation to their preparedness to centrally fund the cost of acquiring and maintaining patents and registered designs, in relation to the size of their annual expenditure relative to the size of the university (science base only), in relation to having a dedicated budget to fund the cost of acquiring and maintaining patents, in relation to the flexibility of the budget (where there was one) and in relation the length of time this form of help had been provided. Once again, Strathclyde achieved the minimum performance laid down for the purposes of this study; Liverpool almost achieved it, but York only scored 24 per cent. The discussion at the end of chapter 9 revealed that a university's approach to the question of the IL office's budget and the budget headings varies from one institution to the next. Since the process of determining the budget, if any, for the cost of acquiring and maintaining patents is singular rather than recurring, this does not lend itself to the formulation of any hypothesis, other than the following.

50) *that there is a marked variation in universities' performance in relation to their preparedness to centrally fund the cost of acquiring and maintaining patents and registered designs, in relation to the size of their annual expenditure relative to the size of the university (science base only), in relation to having a dedicated budget to fund the cost of acquiring and maintaining patents, in relation to the flexibility of the budget (where there was one) and in relation the length of time this form of help had been*

provided.

(xi) Help in Relation to Temporarily Freeing Academics from Their Primary Commitments to Allow Them to Become Involved in University Companies/Joint Ventures/Independent Spin-Off Companies

The cross-case analysis established significant variation in nine universities' performance in relation to the number of frameworks which the centre was prepared to countenance to temporarily free academics from their primary commitments for this purpose, in relation to the amount of free/partially free time which the relevant frameworks offered academics and in relation to the extent to which the centre was prepared to countenance extending the amount of free/partially free time offered by the relevant frameworks. The discussion at the end of chapter 9 revealed that that a university's approach to the question of frameworks to temporarily free academics from their primary commitments varies from one institution to the next. Since this process is singular rather than recurring, this does not lend itself to the formulation of any hypothesis. However, it was noticeable that the two "plate-glass" universities were markedly more generous where this form of help was concerned than the other types of university. This analysis suggested the following, related hypotheses

- 51) *that there is a significant variation in universities' performance in relation to the number of frameworks which the centre is prepared to countenance to temporarily free academics from their primary commitments for this purpose, in relation to the amount of free/partially free time which the relevant frameworks offer academics and in relation to the extent to which the centre is prepared to countenance extending the amount of free/partially free time offered by the relevant frameworks*

52) that the new "plate-glass" universities are more flexible in this respect than "ancient" or civic universities or ex-CATs.

(x11) Financial Help for Academics Who Try to Entrepreneurially Exploit Their Research Discoveries

The cross-case analysis established a marked variation in the nine universities' performance in relation to the range of financial help mechanisms provided, the conditionality with which they were made available and the length of time they had been made available. It also established that the variation was due less to timing than to substantial differences in the extent to which the nine had established financial help mechanisms which could be used to help would-be academic entrepreneurs. The discussion at the end of chapter 9 revealed that a university's approach to establishing financial help mechanisms such as these varies from one institution to the next. It was not possible to establish why some universities had established a more extensive range of financial help mechanisms than others, though noticeably the two universities which were most concerned about risk, Bristol and Durham, had the least extensive range. However, Liverpool was also fairly concerned about risk, yet Liverpool had a greater range of financial help mechanisms in place. Moreover, universities not noted for their risk-aversion had a far less comprehensive range of financial help mechanisms. Since this process seems to be singular rather than recurring, this does not lend itself to the formulation of any hypothesis, other than the following:

53) that the range of financial help mechanisms made available to would-be academic entrepreneurs by their university varies considerably from one university to the next

(xiii) Help in Relation to the Use of University Resources by Academic Entrepreneurs

The cross-case analysis established variation in the nine universities' performance in relation to the range of physical and human resources which academic entrepreneurs were allowed to use, the conditionality with which they were made available, their flexibility with regard to the charges levied and in relation to the decision-making process in relation to those charges. The discussion at the end of chapter 9 revealed that principled decisions as to whether entrepreneurial academics may use the university's physical/human resources - and if so, at what cost - may be taken centrally or locally, depending on the institution and the resource. However, it is evident that the majority of universities was either against academic entrepreneurs using on-campus accommodation or was reluctant to allow this, particularly where extra accommodation was concerned. Where the other physical and human resources were concerned, each university seemed to adopt a fairly idiosyncratic approach. Moreover, much of the variation in performance was due to differences in the extent to which universities were prepared to be flexible about the charges levied for use of such resources.

This analysis led to the following, related hypotheses

- 54) *that there is variation in universities' performance in relation to the range of physical and human resources which academic entrepreneurs are allowed to use, the conditionality with which they are made available, in relation to their flexibility with regard to charges and in relation to the decision-making process with regard to those charges*
- 55) *that the majority of universities will be concerned about use of on-campus accommodation by academic entrepreneurs;*
- 56) *that universities' approach to the use of other physical and human resources by academic entrepreneurs will be quite idiosyncratic,*

57) *that a minority of universities is prepared to be flexible about the charges levied for the use of such resources*

12.5 Heads of Department and Deans

(i) **The University's Assumption of Rights and Responsibilities Previously Enjoyed by the BTG**

The cross-case analysis conducted in chapter 10 established that 82 per cent of HoDs and Deans from whom data were elicited supported their university's assumption of rights to and responsibilities for the exploitation of IP which were previously enjoyed by the BTG. It also established that whether they agreed or disagreed with their university's assumption of these rights and responsibilities, most explained their views in terms of perceived expertise, relevance or control. It was concluded that, judging by the extent of replication and the number of "mentions", expertise was by far the most robust of these categories.

This analysis suggested the following hypothesis

58) *that, asked to explain their views (at the time) on their university's assumption of rights and responsibilities previously enjoyed by the BTG, a large proportion of the reasons cited by HoDs and Deans will be concerned with perceived expertise*

The cross-case analysis also established that these HoDs and Deans imputed quite different motives to their university. While HoDs and Deans from Strathclyde imputed motives connected with the university's mission and its entrepreneurial approach, most of the other HoDs and Deans felt that their university had been motivated first and foremost - or even exclusively - by the anticipation of financial gain

This analysis suggests the following hypothesis

59) *that in most universities most HoDs and Deans will have - or will wish to portray themselves as having - non-pecuniary motives for supporting their university's assumption of rights and responsibilities previously enjoyed by the BTG, whereas they will see - or will wish to portray - their university as being preoccupied with mammon or political expediency*

(ii) Identifying IP Created by Academics

It was revealed in chapter 10 that when asking questions about the context in which commercially exploitable IP might be generated, the interviewer did not first define "intellectual property", and that most interviewees interpreted this narrowly as meaning "hard" IP - manifested by "widgets" or processes, rather than in the widest sense, including "soft" IP - manifested by consultancy, contract research, or even training opportunities

The investigator indicated a number of caveats with regard to this finding, but feels that the following hypothesis is nonetheless worthy of formulation.

60) *that the majority of HoDs and Deans interprets the term "intellectual property" narrowly as meaning "hard" IP - manifested by "widgets" or processes, rather than in the widest sense, including "soft" IP - manifested by consultancy, contract research, or even training opportunities*

The cross-case analysis in chapter 10 established that over two-thirds of the HoDs and Deans regarded the possibility of generating commercially exploitable IP as a "given" - determined by the disciplines - or the fields within those disciplines - on which the staff of university happens to have focussed. In other words, they regarded the generation of

commercially exploitable IP as a matter of chance - a serendipitous combination of being in the right field of the right discipline at the right time. Less than one third of HoDs and Deans felt that the generation of commercially exploitable IP was "creatable", with a will. It was also established that nearly half the HoDs and Deans from the two larger universities espoused the latter view, while nearly all the HoDs and/or Deans in the two smaller universities espoused the former view.

This analysis suggests the following, related hypotheses

- 61) *that the majority of HoDs and Deans regards the generation of commercially exploitable IP as a "given", a function of certain disciplines, whilst a minority regards it as something "creatable", with a will,*
- 62) *that most HoDs and/or Deans in the smaller universities regard the generation of commercially exploitable IP as a "given", while this view is less prevalent among HoDs and Deans in the larger universities.*

The cross-case analysis also established that only 24 per cent of the HoDs and Deans felt that their staff were "very aware" or "pretty aware" of the university's wish to identify potentially exploitable IP. Many of them volunteered reasons for the level of awareness they estimated their staff to have, and as the cross-case analysis established, 31 per cent of the reasons volunteered related to the extent to which the university's wish had been publicised, while a further 25 per cent related to the orientation of their staff, 13 per cent of the reasons volunteered related to the type of research sponsorship attracted by the department/faculty and a further 13 per cent related to experience of IP matters.

This analysis suggested the following, related hypotheses

- 63) *that a minority of HoDs and Deans will characterise their staff as "very aware" or "pretty aware" of their university's wish to identify potentially exploitable IP,*
- 64) *that, should they volunteer reasons for the level of staff awareness of the university's wish to identify potentially exploitable IP, a large proportion of the reasons cited by HoDs and Deans will be concerned with the extent to which they feel the university's wish has been publicised.*

The cross-case analysis also established that 64 per cent of the HoDs and Deans felt that their staff would take a positive view of being asked to "flag" potentially exploitable IP. However, 55 per cent felt that the university should not rely on individual academics coming forward, but should adopt a more proactive approach

This suggests the following, related hypotheses:

- 65) *that a majority of HoDs and Deans will feel that their staff would take a positive view of being asked to "flag" potentially exploitable IP,*
- 66) *that nonetheless a majority of HoDs and Deans will feel that the university should adopt a proactive approach to the identification of potentially exploitable IP*

Finally, the cross-case analysis established that 72 per cent of the HoDs and Deans were against the idea of their university employing "fail-safe" mechanisms - such as scrutinising research proposals and interim/final reports, or scrutinising drafts of papers before submission to journals - as a proactive tactic for identifying potentially exploitable IP. Asked why they rejected these "fail-safe" mechanisms, 33 per cent of the reasons the HoDs and Deans cited related to concern about the requisite expertise, while 26 per cent

related to the perceived cost/benefit and a further 22 per cent related to the time it would take. Most HoDs and Deans assumed that the question implied that someone from the IL office should act as scrutineer. Many HoDs conceded that they had been forced to adopt similar tactics within the department in order to comply with the contractual conditions of research funded by industry, but that they had never thought of applying the same mechanisms to research where the sponsors did not make this a contractual condition. Some HoDs felt that research group leaders should be encouraged to subject interim/final reports and drafts of papers to scrutiny, with a view to identifying potentially exploitable IP, since they alone would have the requisite expertise. Few HoDs or Deans seemed immediately to appreciate that scrutineers from other contexts might identify applications for their IP which fell outwith the industrial or commercial sectors with which their staff were familiar.

This analysis suggested the following, related hypotheses:

- 67) *that the majority of HoDs and Deans will believe that, on grounds of expertise, their own staff are the most appropriate scrutineers,*
- 68) *that the majority of HoDs and Deans will not immediately appreciate that scrutineers from other contexts/organisations might identify applications for their IP which fall outwith the industrial or commercial sectors with which their staff were familiar,*
- 69) *that the majority of HoDs and Deans will acknowledge that the results of research sponsored by industry are subjected to scrutiny both within the department and by the sponsor, but that other research results are not subjected to such scrutiny*

- 70) *that the majority of HoDs and Deans would not agree to the formal imposition of in-house scrutiny for all research results, preferring to encourage research group leaders to do this on an informal basis.*

(iii) **Ownership of IP Generated by Academics**

The cross-case analysis established that 42 per cent of the HoDs and Deans felt that the university should own the IP generated by academics, while 21 per cent felt that academics should own the IP they generated and a further 17 per cent proposed joint ownership as the most appropriate solution. It also established that, asked to explain why they held the view they expressed, 45 per cent of the reasons given by these HoDs and Deans related to the infrastructure provided by the university, while 21 per cent related to the locus of direction of research - *ie* who determined the direction the research would take. It was apparent that only 8 per cent of the HoDs and Deans gave reasons which approximated to the underlying rationale of the patent system.

This analysis suggested the following, related hypotheses

- 71) *that the vast majority of HoDs and Deans does not understand the underlying rationale of the patent system,*
- 72) *that the majority of HoDs and Deans will feel that the university should own the IP generated by members of its academic staff,*
- 73) *that, asked to explain why they hold the views they expressed on ownership, a large proportion of the reasons cited by HoDs and Deans will be concerned with the infrastructure provided by the university*

(v) Protecting IP Generated by Academics

The cross-case analysis conducted in chapter 10 established that 75 per cent of the HoDs and Deans agreed with the broad concept of "protecting" IP generated by academics, but that 50 per cent were against the idea of "protecting" IP by treating it as secret know-how and over two-thirds felt that patenting was preferable to secret know-how as a means of "protecting" IP, if there was a choice. It also established that, asked to explain why they held the views they expressed on the broad concept of "protecting" IP generated by academics, 40 per cent of the reasons cited by these HoDs and Deans related to financial gain. Asked to explain why they held the views they expressed on "protecting" IP generated by academics by treating it as secret know-how, three-quarters of the reasons cited by these HoDs and Deans related to their perception of the function of a university.

The cross-case analysis also established that only 13 per cent of the HoDs and Deans were aware of their university's policy with regard to who has the right of final decision as to whether and how to "protect" IP generated by academics. Having been told what their university's policy was, 58 per cent agreed with it. All those who disagreed were from Liverpool, where - unlike the other three universities - the decision to "protect" or not to "protect" could be taken out of the academic's hands. Asked to explain why they held the views they expressed in this regard, 36 per cent of the reasons cited by these HoDs and Deans related to academic freedom, while 18 per cent related to pragmatic considerations. The cross-case analysis noted that a comparison of these views with the views expressed in relation to who should own IP generated by academics revealed that one was quite at odds with the other.

This analysis suggests the following, related hypotheses

- 74) *that the majority of HoDs and Deans will be in favour of the broad concept of "protecting" IP generated by academics, but will be against secret know-how as a means of "protection";*
- 75) *that, asked to explain why they hold the views they expressed on the broad concept of "protecting" IP generated by academics, a large proportion of the reasons cited by HoDs and Deans will be concerned with the anticipation of financial gain;*
- 76) *that, asked to explain why they hold the views they expressed on treating IP generated by academics as secret know-how, a large proportion of the reasons cited by HoDs and Deans will be concerned with their perceptions of the function of a university;*
- 77) *that the majority of HoDs and Deans will be unaware of their university's policy on who has the right of final decision as to whether and how to "protect" IP generated by academics,*
- 78) *that the majority of HoDs and Deans will prefer academics to have the right of final decision, notwithstanding their views on who should own the IP generated by academics*

(vi) **Entrepreneurially Exploiting IP Generated by Academics**

The cross-case analysis conducted in chapter 10 established that a significant proportion of HoDs and Deans were not *au fait* with the difference between university companies, joint ventures and independent academic spin-off companies. Further, it suggested that when this was explained to them, around 64 per cent said they were in favour of joint ventures with members of the academic staff as a vehicle for entrepreneurially exploiting "hard" IP, while around 52 per cent were in favour of university companies as a vehicle. Independent

academic spin-off companies as a vehicle for the exploitation of "hard" IP seemed to be less acceptable to these HoDs and Deans - particularly those in Strathclyde

This suggests the following, related hypotheses, of which the second must be tentative in view of the calibre of the data in relation to this question

- 79) *that a significant proportion of HoDs and Deans do not immediately understand the difference between university companies, joint ventures and independent academic spin-off companies,*
- 80) *that once they understand the difference, where the entrepreneurial exploitation of "hard" IP is concerned more HoDs and Deans will favour joint ventures with members of staff than will favour university companies, while independent academic spin-off companies will be the least favoured of these three vehicles*

The cross-case analysis established that none of the HoDs and Deans regarded extensive personal consultancy as an "inert" activity, and that the majority felt it would have both a negative and a positive impact. It also established that of the types of impact cited by these HoDs and Deans, 41 per cent related to research, while 24 per cent related to students. The cross-case analysis found these HoDs and Deans to be divided on the question of imposing a time limit on the amount of personal consultancy which could be done, and that their attitudes *appeared* to be idiosyncratic and personal rather than coloured by institutional ethos or the discipline or the amount of consultancy undertaken in the department/faculty in question.

This suggests the following, related hypotheses

- 81) *that HoDs and Deans will not regard extensive personal consultancy as an "inert" activity, but will see it as having both a negative and a positive impact;*
- 82) *that, asked to cite examples of the types of impact extensive consultancy might have, a large proportion of the types of impact cited by HoDs and Deans will relate to research and to students;*
- 83) *that HoDs' and Deans' views on the imposition of a time limit on the amount of personal consultancy which should be done will be personal and idiosyncratic, rather than coloured by institutional ethos or discipline or the amount of consultancy undertaken in their department/faculty*

The cross-case analysis established that only 38 per cent of the HoDs reported the existence of commercial arms within/attached to their department. It also established that thirteen commercial arms were associated with eight departments, giving an average of 1.6 each. The non-financial benefits cited by the HoDs in question fell into three categories of equal robustness - viz. enhancing the department's/the university's reputation, acting as a resource to the department/university and sundry other departmental benefits. It was also established that 46 per cent of the commercial arms established had caused controversy at the outset - most commonly on grounds of the presumed opportunity cost or on grounds of resentment. In the majority of instances, this had been due to "teething troubles", but in two instances, the problems were so intractable that eventually the commercial arm was spun-off as a separate company. The HoDs whose departments did not have commercial arms associated with them explained this in terms of the pointlessness of setting one up and various deterrent characteristics which they imagined to attach to departmental commercial arms.

This analysis suggests the following, related hypotheses

- 84) *that the majority of departments in science and technology-based disciplines does not have a commercial arm,*
- 85) *that the lack of a commercial arm is due either to various deterrent characteristics which it is imagined attach to departmental commercial arms, or because the department perceives no point in creating one;*
- 86) *that a significant proportion of departmental commercial arms cause controversy at the outset on grounds of presumed opportunity costs or resentment;*
- 87) *that the majority of departmental commercial arms overcomes such "teething troubles", while a minority has eventually to be spun-off as a separate company to overcome intractable problems*

The cross-case analysis established that 65 per cent of these HoDs and Deans indicated they would be supportive *in principle* with regard to a request from a would-be academic entrepreneur for a part-time contract for a limited period, while 60 per cent indicated they would be supportive *in principle* of a request for complete leave of absence for a limited period. However, relatively few felt they would be supportive *in principle* of a request for a formal reduction in or a rescheduling of a would-be academic entrepreneur's normal workload for a limited period. The cross-case analysis also established that translating *in-principle* support into practice was another matter, however. Only 20 per cent felt that *in practice* they would support a request for a part-time contract for a limited period, while only 27 per cent felt that *in practice* they would support a request for complete leave of absence for a limited period. However, 60 per cent indicated that *in practice* their support for a part-time contract for a limited period would be conditional upon certain conditions being fulfilled, while 47 per cent indicated that *in practice* their support for complete leave

of absence for a limited period would be conditional upon certain conditions being fulfilled

The cross-case analysis established that the most frequently cited conditions were the nature of the business idea, the academic entrepreneur agreeing to observe time constraints, the moral support of the rest of the department and getting teaching cover. It also established that the most frequently cited reasons given by the remaining HoDs and Deans for refusing to support requests for a part-time contract *etc* for a limited period were the inability to get teaching cover and the logistics of creating a window of time for would-be academic entrepreneurs in these ways

This analysis suggested the following, related hypotheses.

- 88) *that the majority of HoDs and Deans will be supportive in principle of mechanisms to give would-be academic entrepreneurs time to devote to business start-up;*
- 89) *that a part-time contract or complete leave of absence for a limited period will be seen as preferable to reducing or rescheduling a would-be academic entrepreneur's normal workload,*
- 90) *that translating in-principle support into practice will be seen as fraught with difficulties;*
- 91) *that a significant proportion of HoDs and Deans would nonetheless support requests for a part-time contract or complete leave of absence provided certain conditions were fulfilled,*
- 92) *that most of the conditions cited will relate to the nature of the business idea, the academic entrepreneur agreeing to observe time constraints, the moral support of the rest of the department or getting teaching cover.*

(viii) Incentives and Disincentives

The cross-case analysis conducted in chapter 10 established that the HoDs and Deans held widely differing views about the idea of their university taking a cut of the fee earned by academics from personal consultancy. Whatever their view, 24 per cent of the reasons cited related to the extent to which they felt there was a *quid pro quo*, 19 per cent related to staff motivation, while 14 per cent apiece related to the need for transparency, the misconception of the idea, and the benefit to the university. The cross-case analysis observed that there were marked differences between the four universities, however.

This analysis suggests the following, related hypotheses

- 93) *that HoDs and Deans will express quite divergent views on the idea of their university taking a cut of the fee earned by academics from personal consultancy,*
- 94) *that whatever their view, the reasons most frequently cited by HoDs and Deans for the views they express will relate to the extent to which there is a quid pro quo and staff motivation, while the misconception of the idea, the need for transparency and the benefit to the university may also feature;*
- 95) *that there are likely to be marked differences in the views expressed by HoDs and Deans from different universities*

The cross-case analysis revealed that 76 per cent of the HoDs and Deans felt that personal consultancy should be one of the criteria taken into account by promotions committees. It also established that 45 per cent of the reasons given by these HoDs and Deans for the view they expressed related to the appropriateness of the activity, while 20 per cent related to evaluating the activity and 15 per cent related to the need for a holistic approach to

promotion

This analysis suggested the following, related hypotheses

- 96) *that the great majority of HoDs and Deans believes that personal consultancy should be one of the criteria taken into account by promotions committees;*
- 97) *that the most frequently cited reason given by HoDs and Deans for the view they expressed will relate to the appropriateness of the activity.*

The cross-case analysis established that 76 per cent of these HoDs and Deans were aware that their university shared the income from the exploitation of IP, but at least 64 per cent were uncertain or ambivalent about the effectiveness of income-sharing as an incentive to "flag" potentially exploitable IP, while at least 20 per cent felt that it was definitely not an effective incentive. It also established that 44 per cent of the reasons given by these HoDs and Deans for the view they held related to their perception that this was a purely hypothetical reward, while 16 per cent related to the perception that it was a just reward. A further 12 per cent of the reasons cited related to individuals' orientation, while 8 per cent related to a perceived conflict with other policies

This analysis suggested the following, related hypotheses

- 98) *that the great majority of HoDs and Deans will be aware that their university shares the income from the exploitation of IP;*
- 99) *only a minority will regard this as an effective incentive,*
- 100) *that whatever their view, the reasons most frequently cited by HoDs and Deans for the view they express will relate to their perception that this is a purely hypothetical reward*

The cross-case analysis established that 56 per cent of the HoDs and Deans were unaware of their university's policy *vis-a-vis* the income earned by academics from the entrepreneurial exploitation of IP. It also established that the HoDs and Deans from each university had widely differing views on the appropriate treatment of this income. Moreover, 35 per cent of the reasons given by these HoDs for the view they expressed related to the extent to which there was a *quid pro quo*, while 29 per cent related to parity and 18 per cent related to the belief that there were preferable mechanisms for benefitting from academics' entrepreneurial activities.

This analysis suggested the following, related hypotheses

- 101) *that the great majority of HoDs and Deans will be unaware of their university's policy vis-a-vis the income earned by academics from the entrepreneurial exploitation of IP,*
- 102) *that HoDs and Deans will will express quite divergent views on the appropriate treatment of this income;*
- 103) *that whatever their view, the reasons most frequently cited by HoDs and Deans for the views they express will relate to the extent to which there is a quid pro quo or parity with consultancy*

Finally, the cross-case analysis established that at least 52 per cent of these HoDs and Deans felt that the entrepreneurial exploitation of IP should be one of the criteria taken into account by promotions committees, while a further 20 per cent or so were ambivalent, only 16 per cent or so thought that the entrepreneurial exploitation of IP should not be taken into account. It also established that there were marked differences between the four universities. However, whatever their view, 28 per cent of the reasons given by these HoDs and Deans for the view they expressed related to the validity of the

activity, while 22 per cent related to its value and a further 22 per cent related to the validity of the skills inculcated by academic entrepreneurship

This analysis suggested the following, related hypotheses.

- 104) *that a minority of HoDs and Deans will be completely against the idea of academic entrepreneurship being one of the criteria taken into account by promotions committees,*
- 105) *that there will be marked differences between universities;*
- 106) *that whatever their view, the reasons most frequently cited by HoDs and Deans for the views they express will relate to the validity of the activity, the value of the activity or the validity of the skills inculcated by academic entrepreneurship.*

12.6 Academic Entrepreneurship

(i) Sources of Business Ideas

The cross-case comparison of the sources of these academics' business ideas concluded that although ten separate categories had been identified, judging by the extent of their replication and the number of "mentions", the most robust categories were contract research/consultancy, supposed demand/market and demand Grant-aided research was seen as the next most robust, together with academic tool The other categories were not regarded as particularly robust

This analysis suggests the following, related hypotheses

- 107) *that the most common sources of academic entrepreneurs' business ideas are contract research, consultancy and actual or supposed demand;*

108) that the next most common sources of academic entrepreneurs' business ideas are grant-aided research and academic tools developed to assist research or teaching,

109) that the least common sources of academic entrepreneurs' business ideas are their own general expertise, teaching, collaboration with colleagues, role models and the desire to avoid tax

(ii) Motivation

As indicated in chapter 4, over the years researchers have imputed to entrepreneurs a number of motives for engaging in entrepreneurship. These range from need for achievement through need for power to need for wealth and sundry other self-oriented motives. The cross-case analysis in chapter 11 suggests that academic entrepreneurs in the UK were motivated differently - usually by the need for their research group to survive, faced by increasing pressure on research funding. It could be argued that the survival of their research group is self-serving, ultimately, but it is clear from the interviews that these academic entrepreneurs also had the welfare of the individuals concerned very much at heart, as well as the benefit to the UK.

This suggested the following hypothesis

110) that a sizeable proportion of academic entrepreneurs is motivated by relative altruism

(iii) Business Experience

The cross-case comparison of these academics' business experience concluded that 68 per cent were complete novices when it came to business start-up, they had neither business experience, relevant work experience nor any kind of training which might have stood

them in good stead

This analysis suggests the following hypothesis

111) that the majority of academic entrepreneurs has neither previous business experience nor relevant work experience or training when embarking on business start-up

(iv) Networking

The cross-case analysis established that 15 (60%) of the 25 academic entrepreneurs had known/known of other academic entrepreneurs prior to setting up in business themselves - but that only only three (15%) of the 20 who had known/known of other academic entrepreneurs had made use of this potentially useful network.

This analysis suggests the following hypothesis

112) that the majority of academic entrepreneurs has access to an entrepreneurial network - but only a tiny minority actually makes use of this network

(v) Partners

The cross-case analysis established that although the 25 academic entrepreneurs averaged 3.03 partners per business - somewhat higher than has been reported in the literature on high tech academic entrepreneurs in Europe, 51 per cent of those partners were fellow academics, while another 15 per cent were family members, and only 30 per cent of all the partners could be described as having any prior business experience

This analysis suggests the following, related hypotheses:

113) that the majority of academic entrepreneurs chooses partners who have no prior business experience;

114) that the majority of academic entrepreneurs chooses business partners who are fellow academics or family members

(vi) Staff Recruitment

The cross-case analysis established that at the outset only 10 per cent of the businesses founded by these academic entrepreneurs recruited employees with business skills to complement their own, more technical skills.

This suggests the following hypothesis:

115) that the majority of academic entrepreneurs does not recruit employees with business skills to complement their own, more technical skills.

(vii) Roles Played by Academic Entrepreneurs in Their Businesses

The cross-case analysis established that in 56 per cent of the businesses founded by these academic entrepreneurs, the academics themselves assumed the role of managing director, partner or company chairman at the outset - i.e. one of the most demanding business roles.

This suggests the following hypothesis

116) that unless university policy proscribes it, academic entrepreneurs tend to assume the most demanding business roles at the outset.

(ix) Business Aspirations

The cross-case analysis revealed that data were missing in too many instances to be able to put a figure on the proportion of academic entrepreneurs who had made a long-term projection at the outset as to what they wished their business to become. However, it also revealed that 58 per cent of those who were known to have done so made long-term projections which were characterised as ambitious and "infinite", whereas 27 per cent made what have been characterised as finite but growth-oriented projections and the remaining 15 per cent made what have been categorised as finite, limiting projections for their businesses

This suggests the following hypothesis.

117) the majority of academic entrepreneurs who make long-term business projections make projections which can be characterised as ambitious and "infinite" or finite but nonetheless growth-oriented

(x) Academic Entrepreneurs' Objectives

The cross-case analysis revealed two interesting things about these academic entrepreneurs' objectives in approaching a representative of their university to discuss their entrepreneurial aspirations. The first was that in 94 per cent of the instances subjected to this analysis, these academic entrepreneurs had very specific objectives, in only 6 per cent of the instances analysed did they go with a view to a general discussion on the best way forward. The second was that the single most common objective was to set up a commercial arm of their department to exploit the IP in question in 41 per cent of the instances analysed, this was the specific objective, whereas setting up an independent spin-off company was the specific objective in only 25 per cent of the instances analysed, while permission to set up a joint venture with the university was the

objective in only 6 per cent of the instances analysed, as was permission to set up a wholly-owned university company

This analysis suggests the following, related hypotheses

118) that the great majority of academic entrepreneurs which approaches their university to discuss their entrepreneurial aspirations has very specific objectives in mind,

119) that the single most common objective of such academic entrepreneurs is to trade from within the university by setting up a commercial arm of their department

(xi) Assistance Provided by the University

The cross-case analysis established three interesting things. The first was that 74 per cent of these academic entrepreneurs had been assisted in one way or another in their entrepreneurial endeavours by their university, but that 21 per cent of them failed to recognise or recollect this when first questioned. The second was that the most common type of assistance obtained initially by these academic entrepreneurs was use of communications, closely followed by use of accommodation, instrumentation and "miscellaneous". Types of assistance least commonly obtained initially were use of technicians and referral to external sources of professional advice. The third was that although dependency on the university for these types of assistance diminished somewhat once the businesses were more established, it did not diminish significantly. Moreover, the types of assistance most commonly obtained were almost identical: use of communications, use of accommodation, use of instrumentation and equipment. Types of assistance least commonly obtained were use of technicians and any source of professional advice.

This analysis suggests the following, related hypotheses

- 120) *that the great majority of academic entrepreneurs is assisted by their university in one way or another in their entrepreneurial endeavours, but that a sizeable proportion does not immediately recognise or recollect this;*
- 121) *that the most common types of assistance obtained by academic entrepreneurs - both initially and once the business is more established - are use of communications, accommodation, equipment/instrumentation and miscellaneous things like photocopying, stationery*

(x11) **Attitude to the Role Played by the University in Assisting Academic Entrepreneurs**

The cross-case analysis established that in 59 per cent of the instances detailed, the academic entrepreneurs had been entirely satisfied with the role played by their university in assisting their entrepreneurial endeavours. It also established that the reasons given by the other 41 per cent for being less than totally satisfied fell into seven categories, but that judging by replication and the number of "mentions", only two (financial misjudgement and risk aversion) were really robust.

This analysis suggests the following, related hypotheses

- 122) *that the majority of academic entrepreneurs is entirely satisfied with the role played by their university in assisting their entrepreneurial endeavours,*
- 123) *that many of those who are not entirely satisfied cite their university's financial misjudgement or risk aversion as grounds for their dissatisfaction*

(xiii) Intellectual Property Rights and Licenses

The cross-case analysis established that although 59 per cent of the businesses founded by these academic entrepreneurs were either "hard" or a combination of "hard" and "soft" in character, only 28 per cent of them had obtained a license from their university. The cross-case analysis also established that very few of these academic entrepreneurs required a license from the university for the IP which they were exploiting

This analysis suggests the following hypothesis

- 124) that relatively few businesses founded by academic entrepreneurs either have or require a license from their university to exploit the IP in question*

(xiv) Impact of Business Activities on Academic Commitments

The cross-case analysis established that in almost every instance, these academic entrepreneurs conceded that their business activities had impacted on their academic commitments, but that three-quarters of them felt that the impact had been positive, rather than negative. Furthermore, the cross-case analysis established seven distinct categories of impact. However, judging by the extent of replication and the number of "mentions", the categories affect [on] teaching, affect [on] research and imbue[s] transferrable skills were the most robust of the seven. Finally, affect [on] teaching was perceived to be the most dominant impact, but affect [on] research was also fairly dominant, while imbue[s] transferrable skills was considerably less dominant.

This analysis suggests the following, related hypotheses

- 125) that most academic entrepreneurs concede that their business activities impact on their academic commitments, but a sizeable majority perceives the impact to be positive,*

126) that the affect on teaching is perceived to be the dominant impact, followed by the affect on research and, less commonly, the gaining of new, transferrable skills

(xv) Colleagues' Reactions to Academics' Entrepreneurial Activities

The cross-case analysis established that 53 per cent of the reactions attributed to their colleagues by these academic entrepreneurs were negative, while 34 per cent were neutral and just 13 per cent were positive. Furthermore, the cross-case analysis established that 32 per cent of these academic entrepreneurs did not really know what their colleagues thought about their business activities, because the subject was not openly discussed with the academic entrepreneurs themselves. Another 28 per cent perceived their colleagues to resent their business activities for one reason or another. Twenty per cent perceived their colleagues to be jealous of their business activities and another 20 per cent felt there was qualified acceptance for their business activities. Just 16 per cent felt their colleagues actually supported what they were doing.

This analysis suggests the following, related hypotheses

127) that many academic entrepreneurs do not know their colleagues' reactions because the subject is not openly discussed with them

128) that where academic entrepreneurs perceive any reactions to their business activities on the part of their colleagues, those reactions are predominantly negative,

129) that jealousy and resentment are the most dominant negative reactions.

(xvi) Reactions of HoDs to Academics' Entrepreneurial Activities

The cross-case analysis established that in 52 per cent of the instances under consideration, these academic entrepreneurs felt that their HoDs had been supportive, whereas in 28 per cent of the instances, they felt they had been merely neutral. In only 10 per cent of the instances were the HoDs felt to have been positively antipathetic from the outset, however, in another 7 per cent of instances they were felt to have changed from supportive to antipathetic.

This analysis suggests the following hypothesis:

- 130) that the majority of entrepreneurs perceives their HoDs to be supportive with regard to their business activities.*

12.7 Conclusions

This exercise has led to 130 hypotheses being postulated in a grounded way - *ie.* from the data, or rather, from the investigator's analysis of the data. The resulting hypotheses may be less exotic than the imaginative hypotheses some investigators seem to pluck from the air in logico-deductive research designs. They may appear "worthy but boring". Many are relatively low-level. Nonetheless, they have the immeasurable advantage of being firmly rooted in the data. Moreover, they have extrinsic as well as intrinsic value in so far as they provide a baseline from which other investigators may wish to launch other studies of this general area, or of specific sub-areas.

However, it is difficult at this early, exploratory stage to see a way in which these particular, low-level hypotheses might build towards the development of a simple, substantive theory in relation to the exploitation of IP in UK universities. It is not obvious how these hypotheses could be adduced to support a simple, elegant theory such as that

recently formulated in relation to child abuse - viz children who are abused tend to abuse their own children in turn. At best, these hypotheses point very tentatively in the direction of substantive theories which are highly topic-specific - like, for example, universities' approach to the ownership of IP.

In the light of this, an alternative, hopefully more productive approach to theory development will be explored in chapter 13

CHAPTER 13

13 CONCLUSION

As chapter 6 made clear, although this was a grounded, exploratory study, the investigator did not adopt a *tabula rasa* approach to eliciting data, initial data collection was informed to a considerable extent by the literature reviewed in chapters 2-4. It is pertinent, therefore, at the conclusion of this thesis to consider whether its findings contradict, broadly support or illuminate earlier empirical findings and associated substantive theories. It is also necessary, in view of the limited value of the low-level hypotheses formulated in chapter 12, to see whether the opposite approach - viz. drawing broad conclusions - is more productive when it comes to developing substantive theory in relation to aspects of this investigation which were novel. Finally, it is traditional for the final chapter of a social science thesis to detail policy recommendations, as well as suggest fruitful topics for future research.

Let us consider first whether this study's findings contradict, broadly support or even illuminate earlier empirical findings and, where appropriate, associated substantive theories. It would seem that broadly we can divide this study's findings into two: those which contrast with earlier empirical findings and associated theories, and those which support and even illuminate earlier empirical findings and associated theories. Moreover, the dividing line between these two groups would appear to be fairly clear-cut, rather than random, the implications of this clear-cut dividing line will be considered in due course.

Let us look initially at those findings which contrast with earlier empirical findings and, where appropriate, associated substantive theories. Chapter 2 reviewed the literature on the identification and protection of IP. The brief sub-section on identification detailed a series of proactive strategies being pursued in an organised way by a number of US research universities in an effort to prevent exploitable IP being inadvertently given away

through careless publication. It is evident that most of the participating universities had given this matter no serious thought - or, in some cases, no thought at all, while a couple believed (erroneously) that their policy-implementer pursued at least some of these proactive strategies. No existing theory springs to mind which might explain this contrasting finding. However, interestingly, this study established that, in order to comply with contractual terms and conditions, many heads of department/research group leaders were already pursuing certain proactive strategies to identify IP arising from research funded by industry, yet they were not voluntarily pursuing the same strategies in relation to IP arising from publicly-funded research, which the university frequently owned. One theory which might explain this was expounded in the Jarratt Report. This theory held that sins of omission such as this are due to academics putting the interests of their discipline and the international fraternity to which they belong before the interests of the institution which enables them to pursue their disciplinary interests and become a member of that international fraternity. Remembering the numerous examples of these same informants being concerned with the well-being of their university which were detailed in chapter 10, one wonders how useful this theory is when it comes to explaining this particular phenomenon. Most informants were not averse in principle to extending these proactive identification strategies to IP owned by the university, they were averse only to identification strategies which they themselves could not control, in order to ensure publishing delays were prevented or minimised. This urge to publish as much as possible as quickly as possible was clearly driven by the demands made upon UK academics by the iterative research assessment exercises. Since the grade awarded in each research assessment exercise to a unit of assessment (usually roughly equivalent to a department) was intended to have both direct and indirect financial consequences, it could be argued that these academics had the well-being of their department, if not the university as a whole, very much at heart, in their view, however, that well-being was better served by

quantity and quality of publications and a correspondingly good research assessment rating, than by the exploitation of IP. In other words, Jarratt's theory is either out of date altogether, or it has no explanatory power in relation to strategies to proactively identify potentially exploitable IP. We need a different theory altogether, probably one which encompasses the idea that research assessment exercises and strategies to proactively identify exploitable IP represent conflicting rather than compatible demands on academics, and that faced with these conflicting demands, academics perceive a good research assessment rating to do more for their department's well-being better than the exploitation of IP.

The sub-section of chapter 2 dealing with the protection of IP devoted considerable attention to universities' and academics' attitudes to patents and aspects of the patenting process. While it is evident from the literature that the very concept of patenting publicly-funded research discoveries provoked widespread, public debate in US universities - chiefly on grounds of morality, it was rare to find informants in these UK universities who could even understand why there might be a need for a debate of this nature, there was certainly no evidence that such a debate had taken place in any of the nine universities - either centrally or locally at faculty or departmental level. Similarly, there was no indication of concern in these UK universities that the desire to patent one's research findings - or to prevent others from patenting them - might militate against scientific openness; concern about scientific openness was raised only in relation to contract research conducted behind closed doors on behalf of one particular industrial sponsor in one particular laboratory and not in relation to patenting or even contract research *per se*. Nor, it seems, had the prerequisites of the patenting process triggered a debate, despite the difficulties which the lack of a "grace period" can cause UK academics. The investigator's suggestion that UK universities might benefit from joining the WIPO's campaign to

reintroduce a "grace period" fell on deaf ears. It is true that much of the literature on the US relates to the 1970s and early 1980s, rather than the late 1980s. However, the total absence of debate or concern in these UK universities suggests that timing has no bearing on these sharply contrasting findings. How might we explain these contrasting findings? One of the few empirical findings detailed in chapter 2 to be supported by this study's findings is the widespread ignorance about patents and patenting on the part of UK universities and their staff which an OECD survey revealed. This same survey found that US universities and their staff were far more knowledgeable and confident. If we assume an association between the extent of an individual's/a group's actual or perceived knowledge of patents and patenting and the degree to which that individual/group engages in debate on the subject, we might theorise that the complete absence of debate or concern in UK universities about patents and the patenting system is due to widespread ignorance of the issues and procedures.

Chapter 3 reviewed the literature on the exploitation of IP generated in universities, concentrating on licensing and every entrepreneurial framework for exploitation except independent academic spin-off companies. Here, too, many of this study's findings contrast sharply with those of earlier empirical studies. Thus, where licensing is concerned, the investigator was unable to uncover a single instance of concern, let alone debate, about the morality of granting royalty-bearing licenses for the exploitation of publicly-funded discoveries - not even where medical discoveries were concerned. Similarly, there was no evidence of real concern, let alone debate, about granting exclusive licenses. This echoes the absence of debate or even concern about patents and the patenting system, and we might extend the same explanation - *viz.* ignorance - to take in licensing, too. However, it is also worth noting that Britain, unlike the US, has had no Ralph Nader to stir up a wider public debate about the morality of exclusive licenses on

discoveries funded from the public purse. Clearly, our theory needs to accommodate what we might call background as well as foreground factors, and the interaction between background and foreground factors

Where wholly-owned university companies and joint ventures are concerned, many of this study's findings also contrast with those of earlier empirical studies - albeit less sharply. No evidence was found of any of the participating universities having engaged in the kind of open, public debate which took place at Harvard and a number of other prominent US research universities concerning the moral and other aspects of setting up wholly-owned companies or joint ventures to exploit IP. In several of the UK universities a debate certainly took place about the wisdom of setting up wholly-owned companies; on occasion, that debate extended to joint ventures with members of staff. However, that debate took place behind closed doors in the higher echelons of the university's administration and was often occasioned by senior officers and lay officers having conflicting views. It is doubtful that the academic community would have been aware that the debate was taking place; academics would certainly not have been able to contribute to the debate and only those with access to Council/Court papers were likely to discover that a debate had taken place. There are two ways, then, in which UK universities appear to differ from US universities. The debate in the US covers a wide range of issues (moral, financial, organisational *etc*) and is accessible by the academic community, while the debate in the UK focusses purely on financial issues and is inaccessible by the academic community. We might go so far as to theorise that in the UK any debate concerning university companies and/or joint ventures *etc* is closed precisely because of the narrow focus of the university's senior and lay officers. What is not clear is whether this narrow focus is due to ignorance of the wider issues - which would conform to our developing theory concerning widespread ignorance and its impact, or whether perhaps these officers

are deliberately narrowing their focus, and if so, why

In contrast with chapters 2-3, if we turn our attention to empirical findings and associated substantive theories detailed in chapter 4, we find that most of this study's findings support and, on occasion, illuminate much of the earlier work. In part, at least, the strand of the investigation concerned with academic entrepreneurs was the least novel, in the sense that the study took the opportunity to pose what are by now fairly routine questions with a view to contributing to the debate concerning the most useful theory of entrepreneurship - viz nature versus nurture, here, the novelty lay simply in eliciting these data from UK academic entrepreneurs, specifically. Since no attempt was made to identify psychological traits, this study cannot offer ammunition to "naturists" - beyond noting that all the academic entrepreneurs identified as candidate informants were male; and that the vast majority of informants selected turned out to be only children, first children or the eldest male. Clearly, these findings could equally be used as ammunition by "nurturists" since it is widely accepted that males and only/first children tend to be socialised differently to female and younger children. Where nurture is concerned, this study's findings support those of earlier studies with regard to the incidence of family involvement in small business, exposure to other role models, age upon founding the first business *etc etc*. Likewise, circumstantial evidence suggests that a significant proportion of entrepreneurs are "pushed" into business start-up as a result of perceived negative aspects of the organisation for which they were working, rather than "pulled" into business start-up. These are findings, then, which support earlier empirical research and associated substantive theories. They are also illuminating findings, for they strongly suggest that these UK academic entrepreneurs exhibit most of the socialisation-related characteristics exhibited by entrepreneurs the world over. This is quite at odds with conventional wisdom *vis-a-vis* UK academic entrepreneurs, which seems to regard them as so fundamentally

different as to be ineligible for membership of the entrepreneurial club

Admittedly, this study's findings also support earlier studies in the US which differentiated the business strategy of academic entrepreneurs from those who spun off from organisations other than universities. This study found that, just like their US counterparts, initially these UK academic entrepreneurs lacked previous business experience, tended to choose partners with no previous business experience, made little or no use of entrepreneurial networks which were available to them, assumed the most demanding business roles and omitted on the whole to recruit staff with complementary skills to their own. However, the most illuminating aspect of this is that initially, at least, US academic entrepreneurs exhibited business strategies which were deemed to be inept compared to those of their non-academic counterparts - and these UK academic entrepreneurs exhibited by and large the same, inept strategies as their US academic counterparts. If the sizeable proportion of UK academic entrepreneurs founding anything from 2-6 businesses - some in parallel - is typical of academic entrepreneurs in other countries, this initial ineptitude may well be self-correcting, in any case, it may not characterise their strategy in relation to businesses founded subsequently. Yet conventional wisdom persists in regarding UK academic entrepreneurs as different breeds altogether to their American counterparts.

From the perspective of theory development, these are interesting and thought-provoking findings. This study is not in a position to comment on the truth of claims frequently made by observers in the UK *vis-a-vis* the relative "success" of US academic spin-off companies compared to those founded by UK academics. However, even if it could be demonstrated that UK academics' spin-off companies are on the whole less "successful", the similarities between academic entrepreneurs and non-academic entrepreneurs the world over and the similarities between UK and US academic entrepreneurs specifically suggest that our

search for explanations should focus on the contexts in which these academic entrepreneurs operate, rather than on characteristics and strategies of the entrepreneurs themselves, as has been the assumption of most commentators to date. If we return for a moment to the observation that there is a clear-cut dividing line between earlier empirical findings which were supported by this study and earlier empirical findings with which this study's findings contrasted, we can see at once that by and large those relating to academic entrepreneurs were supported, while those relating to the context in which academic entrepreneurs operated (*eg* the university, the background culture) were usually contrasting - indeed, often sharply contrasting. Thus, there is internal evidence pointing to the likely significance of context, as well as external evidence

As chapter 4 indicated, context has not entirely been neglected by researchers, many have considered the extent to which individual universities act as incubators to spin-off companies. The investigator would argue that while this is a start, ultimately it is too narrow an approach. Future researchers should funnel out systematically from the academic entrepreneur's department, to his/her specific university, to the university system, to the community in which the specific university is situated, to characteristics of the surrounding region and ultimately to characteristics of the country as a whole. This study provides numerous pointers as to factors which might operate within and/or across these levels in such a way as to impact upon an activity like academic entrepreneurship. What this study has not tried to do is to devise an analytical technique which could accommodate the potential for contextual factors from different levels to interact with each other (*eg* constraints such as staff student ratios imposed on departments by the UFC); this analytical technique would also have to incorporate some kind of weighting (to reflect, *eg* the relative power of the centre and departments over budgets) and have the ability to accommodate changes (*eg* in key personnel), Venn diagrams might offer a useful way to

demonstrate relationships graphically The resulting theory would have to be equally accommodating if it is to have explanatory or predictive power.

The likely impact of context on the incidence or "success" of academic entrepreneurs brings to mind the theory - detailed in chapter 1 - that many of the UK government's science and technology policies and mechanisms fail to have the desired effect because they have been transplanted from other countries with little or no prior attempt to identify the processes and contexts which contribute to their success or failure in their native country, and little or no prior attempt to get to grips with the implications of transplanting them into the UK. If we "unpack" this theory, we can see that prior analysis of the implications should have at least three foci - viz the likely affect of transplantation on the policies/mechanisms themselves, operating in a different local and national context, the likely affect of these transplanted policies/mechanisms on the recipients, and finally, whether this latter affect, in turn, feeds back to impact on the operation of the policies/mechanisms themselves Although this study was not designed to test this theory, it is a theory which appears to have considerable explanatory power where its findings are concerned, moreover, its explanatory power extends not simply to academic entrepreneurship, but to other aspects of the identification, protection and exploitation of IP generated in universities

In order to illustrate this, let us first take a retrospective look at the affect of this transplanted mechanism on these particular recipients The UK government apparently did little or nothing to assess its likely affect - presumably because it naively assumed or hoped that the mechanism would impact upon the recipients, rather than the other way around Moreover, it is questionable how much government, or others acting upon its behalf, did to prepare UK universities for what was to come Chapter 5 examined the

sources of assistance available to UK universities in 1985/86 and the years which followed. It drew attention to the woolliness and ambiguity of the Kingman letter and the DES statement. Whatever the reason(s) for the woolliness of these documents - and note ⁽⁴⁾ speculates what the reason(s) might be - UK universities have been ill-served by these and other sources of guidance with respect to the exploitation of IP. None of them has filled the gap identified by Moore (1975) - that is to say, none of them has really departed from the broad concept and focussed in a comprehensive way on the fine structure. Moreover, notwithstanding Kingman's eleven points, none of them has really flagged the issues which universities need to address, none of them has encouraged UK universities to engage in the kind of debate which US universities seem to have engaged in partly of their own volition and partly as a result of having to respond to government concerns concerning conflict of interests. And even if the ESG could not itself provide this kind of guidance or facilitate this kind of debate at the outset, documentation circulated in 1986 stated that it was the ESG's intention, after evaluating universities' performance during the first three years of authorisation, to identify what constituted good practice. In fact, the ESG apparently failed altogether to get to grips with this question, let alone to disseminate its conclusions, one could be forgiven for regarding it as something of a damp squib.

To be charitable, it is possible that the ESG assumed a greater level of expertise and sophistication than most UK universities had. Comparison of this study's findings with earlier empirical findings relating primarily to US universities has already led the investigator to attribute the differences found to US universities being relatively knowledgeable and UK universities being relatively ignorant in relation to key issues and procedures. It is arguable that the generally inadequate performance of all nine participating universities against the measures detailed in chapters 7-9 stems in part at least from the fact that most were doing no more than paying lipservice to the responsibilities

which they accepted at the same time as accepting rights previously enjoyed by the BTG
This should not be taken to imply that these particular universities were consciously,
cynically paying lipservice to those responsibilities, rather, this lipservice was due to
ignorance of what those responsibilities implied and entailed, ignorance which the
Kingman letter and the DES statement did little to counteract.

Ignorance can eventually be overcome through experience, a quicker alternative is to
obtain expert guidance. Since, for whatever reason(s), the ESG failed to ensure the
requisite guidance was provided, universities which took their responsibilities seriously
were obliged to seek guidance themselves - by commissioning consultants (as Glasgow
and Strathclyde did, with questionable results) or by appointing supposed experts to their
own staff, as several tried to do. There are several things which it is pertinent to note
about this. The first is that this was liable to lead to 60+ universities individually re-
inventing the wheel, which was hardly an efficient strategy. The second is that obtaining
expert guidance by either route involved incurring direct costs, which universities
themselves were obliged to bear, since the government made no additional funding
available to universities which accepted the rights and responsibilities previously enjoyed
by the BTG. At this time most UK universities, we should remember, were still struggling
to accommodate cuts imposed by the UGC in the early 1980s. It is probably no
coincidence that only Glasgow and Strathclyde opted to commission consultants, for the
Scottish Development Agency bore a significant portion of their costs, there was,
apparently, no equivalent agency which the other seven universities could approach for
this kind of support. It is also noticeable that several of the participating universities set
about trying to acquire staff with the requisite expertise by dint of seeking secondees from
companies or by employing older industrial or commercial staff who were about to be or
had already been made redundant; both tactics were consciously pursued in an effort to

minimise the direct cost and in the participating universities which pursued these tactics, the result was not particularly successful. The third point is that even if universities felt they could justify the expense of appointing an expert to their own staff, to date staff supposed by UK universities to have the requisite expertise have invariably been appointed primarily as *policy-implementers*. This is not surprising since it would be extraordinary for UK universities to employ staff (as opposed to consultants) in a policy-making/recommending capacity alone. This probably goes some way to explain the confusion between policy-makers and policy-implementers which was identified in many of the participating universities. The fourth point - which relates to the wider context of the skills base of the UK employment market - is that universities which decided to appoint supposed experts to their own staff (whether as policy-implementer alone or tacitly as policy-maker-cum-implementer) have not found it easy to identify candidates for appointment who genuinely have the requisite expertise. At present, this kind of expertise is very thin on the ground. The solution to this problem may simply be a matter of time, if the US experience is repeated in the UK, we may find expert university technology transfer staff emerging as a distinct, new UK profession over the next 10 years or so.

We can see quite clearly how failure to analyse the affect of this mechanism on the recipients, failure even to adequately prepare the recipients for what was to come led to the nine universities pursuing quite idiosyncratic strategies and obtaining guidance of variable quality - or none at all. We can also see how the recipients' idiosyncratic responses to the introduction of this mechanism fed back and impacted upon the context in which the mechanism operated. It is not at all surprising that the nine universities turned in such variable performances against the measures outlined in chapters 7-9, which effectively evaluated the operationalisation of this new mechanism in its new context.

One cannot help thinking that many of the problems attached to obtaining guidance should have been foreseen and avoided. With a little forethought, the ESG could have assembled the names of individuals with *policy-making* experience who could have acted as consultants to UK universities. The most likely source of such individuals was, admittedly, the United States, however, despite marked differences in the university systems of the two countries, there is no reason why such individuals could not have acquainted UK universities with the likely issues, with the likely procedural and resource implications of this new mechanism - or at least provided milestones for individual UK universities' own, idiosyncratic discussion of the issues and the procedural and resource implications. Moreover, it takes only a modicum of vision to deduce that such contractor/consultant relationships could have led in the long term to fruitful, synergistic developments - *eg* through informal networking and even more formal arrangements such as twinning with like-minded universities in north America or wherever. There is no reason why they could not even have led to joint marketing arrangements and even joint ventures.

In case further proof is needed, let us now take another look at the affect of context on the operation of this new, transplanted mechanism. It is clear from this study's findings that even if the ESG had proceeded in this rational and even visionary way, there were differences in the narrower or wider context in which this transplanted mechanism had to operate which were not the result of failure to analyse the impact on the recipients, failure to prepare the ground adequately. Where the wider context is concerned, the dearth of experienced university technology transfer professionals in the UK has already been noted. Where the narrower context is concerned, this chapter has already identified a number of contextual differences between US and UK universities with regard to issues related to the identification, protection and exploitation of IP. It has not, as yet, shown whether such contextual differences seem to impact upon the operation of this transplanted mechanism -

and if so, in what way(s) If we can establish that the nine participating universities exhibit relevant contextual differences, we may be able to ascertain whether these differences impact on the operation of this transplanted mechanism, and if so, in what way(s). The nine were selected on the basis of the variable distribution of five "objective" criteria The idea was to see whether any or all of these criteria were associated with certain policies or practices and throughout chapters 7-11 consideration was given to this question. In fact, although tentative patterns could be detected in relation to specific measures, and occasionally specific groups of measures, no clear picture emerged in the sense that a certain criterion or certain criteria were regularly associated with performance *vis-a-vis* thematically aggregated measures (*eg* providing guidance or help)

What did emerge, however, was a (more gut than quantifiable) feeling that the culture or ethos of these universities differed appreciably and that certain cultural characteristics appeared to impact upon these universities' performance *vis-a-vis* some of the measures outlined The most readily identifiable cultural characteristic to impact upon performance is one which we might call risk-orientation. In Bristol, Durham, Liverpool and York frequent (and often disparaging) reference was made by a variety of informants to their university's risk-aversion, as far as informants from Bristol, Durham and York were concerned, this alleged risk-aversion affected not only the exploitation of IP but also other areas of university activity. At Strathclyde several informants complained about the extent to which their university was prepared to take risks - primarily but not exclusively with regard to the entrepreneurial exploitation of IP In City, Glasgow, and Kent, in contrast, risk-orientation did not seem to feature - or not, at least, in the minds of the informants, while only one informant at Hull characterised the university as risk-averse - and this related to an a situation obtaining over 15 years earlier These universities, it would appear, are indifferent to risk, rather than averse to risk or positively disposed to risk. In

Bristol, Durham and Liverpool, this risk-aversion had fairly similar consequences from the perspective of this study - viz reluctance to allow the university's "hard" IP to be exploited entrepreneurially; in York, in contrast, risk-aversion took the form of spinning off as independent companies research groups whose activities were perceived to expose the university to risk and appeared to have little or no impact on the university's willingness for the university's "hard" IP to be exploited entrepreneurially This demonstrates that local conditions - such as a university's risk-orientation - can and do impact upon the operation of this transplanted mechanism

This demonstration also gives us insights into the difficulties which could confront researchers wishing to identify and evaluate local conditions which might impact - positively or negatively - on the operation of transplanted mechanisms such as this. It is worth noting that this study did not set out to explore the risk-orientation of these universities, the chosen research design and methodology simply made it possible for the data to emerge and to be accommodated in the analysis. Anyone wishing to conduct further research on the possible impact of local or national conditions should probably bear this in mind, for it is not immediately clear how useful, say, a survey might be; surveys cannot identify and accommodate previously unsuspected contextual factors, especially if these are process-derived Contextual factors are not necessarily what we might characterise as "simple" - such as relative size or type of university They may be multi-faceted and complex and may only emerge after the investigator has cast his/her net fairly wide in terms of data collection and paid some attention to theory development

This study provides an excellent example of this The time-frame for data collection was, the reader will recollect, 1970-1990, rather than 1985-90, due to the investigator's assumption at the outset that universities were unlikely to have formulated their current

policy and practice purely in response to the Kingman letter and the DES statement. This assumption was, by and large, correct, however, the fact that so many of the nine were only just beginning to consider policy and practice when these documents arrived was something of a surprise. The picture which emerged was of universities which, with two exceptions, refused during the mid-late 1970s to respond to requests from members of their own academic staff to take a considered, proactive interest in industrial liaison and in the exploitation of IP in place of their reactive, *ad hoc* approach. These same universities eventually responded in the 1980s to external stimuli (the need for income generation and political expediency). They also focussed purely or primarily on the extrinsic value of the exploitation of IP. Only two of the nine universities, City and Strathclyde, had taken an interest in the exploitation of IP of their own volition - a decision which was taken "at the top" - by the Vice-Chancellor and Director of Finance, and by the Principal respectively. Both institutions were motivated primarily by the intrinsic value of exploiting IP, though neither would deny that the extrinsic reward was "nice if you could get it". In both these universities, subsequent Vice-Chancellors/Principals and key members of the administration have continued to act as "champions" where the exploitation of IP is concerned - a succinct illustration of the importance of "product champions" in technology exploitation which is highlighted in the literature.

Whether a university is motivated by the extrinsic or intrinsic value of exploiting IP may well have, *per se*, no relevance to the point the investigator wishes to make, it is the corollary to this external/internal stimulus and extrinsic/intrinsic dynamic which is relevant - and also of interest in terms of theory development. Unlike City (which believes that it has been lucky), Strathclyde has made what it perceives with the benefit of hindsight to be mistakes with regard its policy and the manner in which its policy was implemented. Notwithstanding City's much-vaunted luck, both universities have been on a

learning curve for 15-25 years - and both still see themselves as being on a learning curve. The ongoing involvement of the Principal at Strathclyde and the Secretary at City - each of whom has assumed the role of policy-maker to their institution - has meant that policy and practice could be monitored and evaluated and changes made, where necessary, in Strathclyde, this has led to a number of revolutionary changes, as well as incremental changes. Those universities which were driven by external stimuli in the early to mid-1980s to take an interest in the exploitation of IP have clearly had less opportunity (in terms of time) to take advantage of the learning curve. It would also seem that many of the universities which responded to external stimuli in the 1980s have not progressed along this learning curve to the extent that they might have done. If we consider, say, Glasgow's and York's experience during the mid 1980s and Kent's experience during the whole of the 1980s, we have ample evidence that there has been the opportunity for progressing along the learning curve. We can also see, if this study's analysis is correct, that progress along the learning curve should entail a radical rethink in universities which have no standing policy-maker/group of policy-makers who can monitor policy and practice on an ongoing basis. Policy-making is not a once-and-for-all activity; more is required than simply formulating a skeletal policy and putting a policy-implementer in place, or simply appointing a policy-implementer, period. Casting policy-implementers adrift without benefit of a map invariably ends in shipwreck, yet only Glasgow seems to have learned in the course of the 1980s that a standing group of *active* policy-makers is required, and that *actively* monitoring the activities of the policy-implementer on an *ongoing* basis on a micro level should be part of their remit. York still has a stop/start approach to policy-makers and monitoring. Kent, where policy-implementers have been cast adrift not just once but three times in succession, appears to have made little or no progress at all along the learning curve. There is little evidence of real progress of this sort at Bristol, Durham, Hull or Liverpool, either

This example also illustrates the difficulty entailed in locating such complex contextual factors in this particular theoretical model - the difficulty of getting the dynamics right. Should we regard this (presumably causal) relationship between responding to external stimuli and/or placing a purely extrinsic value on the exploitation of IP and failure to progress as far as possible along the learning curve as a byproduct of foisting a mechanism on a university without adequately preparing the ground, or should we regard it as a "natural" characteristic of the university? The impact of the ESG's sins of omission on universities, many of which were ignorant of key issues and procedures, has already been considered. The investigator would argue, however, that there comes a point when universities themselves have to assume responsibility for at least some of their inadequacies - and that six years on, that point has surely been reached? Glasgow's insight is not, after all, particularly startling or idiosyncratic if one views the exploitation of IP in the same light as any other managerial responsibility. At the end of the day, assessing whether this is a "natural characteristic" or a by-product is probably a question of individual judgement.

Chapter 13 has periodically drawn attention to fruitful topics for future research, as have chapters 7-11. At this stage of the thesis it may be helpful to consider projects more comprehensive than those which have been flagged thus far. It would be interesting to return to these nine universities some ten years later to elicit the same types of data presented in chapters 7-9. Having kept informally in touch with many of the nine universities which participated in this study, the investigator is aware of changes in key personnel and even in organisational structures which have taken place since 1989/90, judging by these particular universities the situation would appear to be dynamic rather than static. However, these may be surface rather than fundamental changes, moreover, these changes may be the result of crisis management rather than a means of achieving

considered goals in a planned way; and even if they are goal-directed, are they directed at the same goals as the DES statement - or at additional or alternative goals which the government has articulated in the intervening years - or do they reflect the individual university's idiosyncratic agenda, or even UK universities' own, collective agenda?

What research design and methodology should this follow-on study employ? The value of this investigation's chosen research design and methodology for a project which is trying to uncover potentially complex processes has already been discussed in chapter 6. No comment has been made about the operationalisation of the methodology - particularly in relation to the evaluative goals of this study, however. In order to function as the second phase of a longitudinal study, the follow-on study would also have to be evaluative as well as descriptive. The validity of the type of measures employed in this investigation is therefore critical. There is both internal and external evidence that the measures constructed for the evaluative part of this investigation were both appropriate and reasonable. Since at least two of the UK's "traditional" universities⁽²⁾ - Cambridge and UMIST - are known to waive all their rights as employers to IP created by their employees in the course of their employment, we must assume that the measures created in chapter 7 are both appropriate and reasonable. Although the minimum performance requirements laid down in chapters 8-9 were constructed on a purely theoretical basis with no reference to the data, it is noticeable that most of the measures created resulted in a score of 100 per cent on the part of at least one - and often many more than one - of the participating universities. It is therefore fair to assume that individually, certainly, most of these measures were both appropriate and reasonable. This begs the question: is there any reason to suppose that treating each as a logical step towards a coherent, comprehensive whole was either inappropriate or unreasonable? Was it, perhaps, naive to expect universities to have responded to this new initiative in the coherent and comprehensive

way outlined? After all, this particular initiative came after half a decade of externally-driven initiatives which forced UK universities to inspect their navels to a degree to which they were not accustomed, furthermore, arriving, as they did, in May 1985 - just two months after the publication of the Jarratt Report, it could be argued that UK universities were too preoccupied - possibly even too punch-drunk - to respond in a coherent and comprehensive manner to the Kingman letter and the DES statement. The fact that over half of the participating universities nonetheless set up groups charged with responding to the Kingman letter and the DES statement (as opposed to leaving it to individuals) - a task which, by definition, should have involved identification of the procedural and resource-based implications and appropriate policy-formulation, suggests that the investigator should not stand accused of naivety or idealism where this is concerned. If anyone should stand accused of naivety, the candidate of choice should surely be the ESG?

A number of interim projects to build on this research come to mind, too. In view of the emphasis which this study's conclusions place on the likely impact of context, this would be the most useful focus; this might entail focussing narrowly on contextual factors which appear to impact on academic entrepreneurship, or focussing more broadly on the identification, evaluation, protection and exploitation process as a whole. A strong case has already been made for an initial methodology which is similar to that employed in this study, in order to identify a range of contextual factors which seem to be associated with differences in the operationalisation of the new mechanism. It might then be possible to use a survey to ascertain how prevalent these contextual factors are in UK universities. Having ascertained this, it would be interesting to return to the initial methodology to do a rigorous, context-controlled study of actual impact(s) on policy and practice, on the operationalisation of the post-BTG mechanism (if it is still the mechanism of the government's choice), a study which would aim to clearly demonstrate cause and effect.

It was the UK government's aim, when rescinding the BTG's so-called monopoly, for the exploitation of IP to benefit from competition, universities were explicitly told not to adopt exploitation procedures which were tantamount to an alternative monopoly; the AUT was equally concerned that universities themselves should not ape the BTG's *modus operandi*. The findings of this research suggest that from the point of view of their academic staff, some UK universities may, in fact, have engineered themselves into what is tantamount to a monopoly situation. This would be an interesting area to research, since much would hinge on the interpretation of what constituted a monopoly.

In view of this study's conclusion that the generally inadequate performance of these universities was due in part at least to ignorance of the relevant issues and procedures, it would be interesting to establish whether the DTI's 1992 innovation initiative, "Support for Industrial Units", has diminished the degree of ignorance in those universities which were funded, and whether that diminution, in turn, has had an affect on policy or practice - and, perhaps, on the operationalisation of the post-BTG mechanism.

Another area of interest is the businesses founded by academic entrepreneurs. It was noticeable that the businesses spinning off from York grew "organically" (*ie.* at their own pace, under their own steam initially, but with a certain amount of early feather-bedding from the university). These businesses achieved a sizeable turnover and employment record in terms of the number and calibre of staff. In contrast, many of those spinning off from Strathclyde, which refused to feather-bed them, were subjected to planned - even forced - growth from the start, in order to repay sizeable venture capital injections made at the outset. The investigator has a hunch that enforced growth is, by and large, not the right approach for university spin-off companies where the entrepreneur(s) concerned retain their status as academic(s). Enforced growth puts unnecessary pressure on the

academic(s) involved, on their department(s) in turn, on the university - particularly if it has a significant equity stake, and on the company. The recent emphasis in the small business literature on growth for growth's sake - and at a rate reminiscent of the growth of the mushroom cloud over Hiroshima - is probably inappropriate for this kind of university spin-off company. Many academic entrepreneurs are motivated, as this study established, by the wish to keep their research group going or to financially benefit their department or the university, if the company's income must all be committed to repaying loans, these academic entrepreneurs will not be able to fulfil their objectives. That, in turn, could be the cause of tension - or enhanced tension - between the entrepreneurial academics and their department. This is an area which could clearly benefit from further research.

In fact, this particular contrast between Strathclyde and York may be symptomatic of a more fundamental difference between the two universities. If we compare the *modus operandi* of the two with regard to managing the exploitation of IP, we might tentatively characterise York's approach as akin to what TII calls "zero management", in the sense that researchers are pretty much left, whether they like it or not, to exploit their IP as they see fit, and if they do not see fit to assume responsibility, it is relatively unlikely to be exploited, for the ILO's contribution seems to consist primarily of approaching potential licensees on behalf of academics. We might characterise Strathclyde as a university which is prepared to tolerate "zero management", if that is what academics want, but which prefers trying to attract academics to take advantage of the guidance provided by a "professional management" on a scale which is unparalleled among the nine participating universities. (These two universities do not quite exemplify the diametrically opposing approaches of Cambridge and Salford, but they are not totally dissimilar.) Interestingly, both universities were ranked equal first in chapter 7. Confronted by different approaches

as such as these, it is not uncommon for the government to pose the question: which constitutes "best practice"? The investigator would argue that there is no value in trying to establish "best practice", since universities are not a homogeneous group; moreover, it would be both difficult - and doubtless undesirable - to try to turn them into a homogeneous group. Nonetheless, it is pertinent to consider whether either of these approaches constitute good practice, or whether neither or both do. And if both should be deemed to constitute good practice, does one constitute better practice than the other? Or is good practice by definition a context-specific notion?

This begs another question: good practice from whose perspective? The academic's, the university's, the UK's or the technology's? From the academic community's perspective, Strathclyde's ability to offer "professional management" and its preparedness to tolerate "zero management" may constitute better practice than York's more one-dimensional "zero management". From the university's perspective, should this judgement be made on a purely financial basis (akin to return on capital invested, always supposing this could be calculated) or should it be made on some other basis, or on several bases simultaneously? From the UK's perspective, we might feel inclined to argue that Strathclyde's "professional management" constituted better practice. Certainly, if we judge on the basis of income earned from the exploitation of IP, Strathclyde expected to end 1992 having earned close to £3m in this way, while York earned a negligible proportion of this. But perhaps we should be more discriminating than this. As chapter 11 revealed, the businesses which spun off from York exhibited a higher average and aggregate growth than those which spun off from Strathclyde. From the UK's perspective, in terms of job and wealth creation, the businesses incubated at York were actually more productive than those incubated at Strathclyde, despite its "professional management" input to many of them. There might be non-financial perspectives, too. This is another area which could

clearly benefit from further research - in order, at the very least, to clarify the issues.

Let us turn finally to policy and other, related recommendations. One could assemble any number of recommendations from a study of this scope and magnitude, for the sake of brevity, let us concentrate on the most important, starting with recommendations addressed to the UK government. Firstly, if the UK government believes that policies and mechanisms adopted in other countries offer a means of achieving its own science and technology goals, it should not attempt to transplant such policies and mechanisms without in-depth prior analysis of the processes and contexts which contribute to their success in their native country, nor without in-depth prior analysis of the implications of transplanting them into the UK. Secondly, if the government takes the decision to transplant certain policies and/or mechanisms on the basis of conclusions reached as a result of prior, in-depth analyses, it should nonetheless ensure that this is followed in due course by in-depth analysis of the actual results of this transplantation process.

Thirdly, if the government still regards the new, post-BTG mechanism as a means of achieving its enterprise-related goals (and the trend towards giving universities ownership of IP generated in collaborative projects suggests that it does), the ESG - or perhaps the Research Councils - should commission research which would lead to an in-depth analysis of the actual results of transplanting this mechanism from the US. Fourthly, even though it is six years since the majority of the UK's universities were authorised by the ESG, the ESG - or perhaps the Research Councils - should assemble a group of genuine experts (drawn in part, perhaps, from the US) who would prepare a document which gives UK universities adequate guidance on the issues and procedures which they need to take into account when formulating their policy on the identification, evaluation, protection and exploitation of IP - experts who might develop the kind of beneficial, long-term

relationships with UK universities envisaged above

The next group of recommendations is addressed to UK universities themselves

Universities - that is to say, their senior officers - should reach a consensus on whether the university really wishes to take the identification, evaluation, protection and exploitation of IP seriously, or whether it actually wishes to do no more than make a ritual obeisance in the direction of government. If it is agreed that the university wishes to take this seriously, the senior officers should ensure that there is a dedicated, identifiable, standing group of policy-makers (with at least some continuity of membership) with explicit responsibility for this. Those policy-makers, in turn, should use the guidance which the ESG - or perhaps the Research Councils - should provide as a basis for initiating an informed, open, public debate on the issues and implications of taking the exploitation of IP seriously, at the end of this process, they should formulate their policy. That policy should be detailed, transparent and unambiguous and it should be committed to paper in a form which is readily accessible to members of the academic and technical staff, and to candidates for appointment as members of the academic or technical staff. The policy-makers should agree detailed guidelines with the university's policy-implementer, and should actively monitor both policy and its implementation on an ongoing basis, and making (and publicising) changes, if necessary. The policy-makers should also consider creating some kind of forum in which the issues and implications of IP exploitation can be debated afresh, should experience throw up unforeseen issues, opportunities and problems.

Finally, policy-implementers should recognise that they will always have a relatively small number of staff compared to the number of academic and technical staff in their

university. In place of the "closed shop", arcane mysteries approach to the identification, evaluation, protection and exploitation of IP which this investigation suggests may be the norm, they should adopt a *modus operandi* which gradually, through action learning "skills" members of the academic and technical staff, so that they have an increasingly large team of helpers dispersed throughout the academic community.