

**INTERIM EVALUATION OF KNOWLEDGE  
TRANSFER PROGRAMMES FUNDED BY  
THE OFFICE OF SCIENCE AND  
TECHNOLOGY THROUGH THE SCIENCE  
BUDGET**

**FINAL REPORT**

**CASE STUDIES**



*economic development consultants*

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# 1 University of Bristol

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## **Background**

- 1.1 The University of Bristol has a long track record of excellence in teaching and research and, more recently, has developed a strong commitment to industry and enterprise. In 2003/4, the University had some 16,000 students, 5,000 of which were postgraduates.
- 1.2 The emphasis on research is reflected in the Research Assessment Exercise (RAE) results, with Bristol having 78 per cent of its departments judged to be world-class or internationally excellent (5 or 5\*) in the 2001 RAE, and receiving ten 5\*\* rated units of assessment in 2003.
- 1.3 Around five years ago the University recognised that world class universities around the world were not only strong in teaching and research, but also had a very strong enterprise agenda integrated into all aspects of their culture. It was therefore determined that there was a need for enterprise and collaboration with industry to become a core function of Bristol's activities.

## **Reasons for applying to the Knowledge Transfer Programmes (KTP)**

- 1.4 The ethos of the University prior to 1999 had been strongly oriented towards research and teaching, with enterprise being seen as something of a distraction. The recognition of the need to develop an enterprise and industry agenda initially began among a small group of the University's senior management, and the Knowledge Transfer Programme funding proved to be a catalyst for this function.
- 1.5 In the words of the University's Director of Enterprise, Dr. Neil Bradshaw, 'prior to 1999, Bristol University had prioritised, quite rightly, research as the main objective – with considerable success. It was however a late starter in relation to the enterprise agenda. The KTP funding provided vital resources to make the enterprise agenda a core function in the University of Bristol'.

## **Applications within the Knowledge Transfer programmes**

1.6 Initially, Bristol applied successfully for funding under the Science Enterprise Challenge programme (SEC) and was awarded funds of £2.6m which provided resources for the newly developing enterprise activities within the University. This was initially a solo application by Bristol and was used to found the then Bristol Enterprise Centre (BEC). However, having successfully initiated the enterprise agenda within the University, Bristol subsequently applied for other Knowledge Transfer Programmes and received funding for:

- A second application to the SEC for a collaborative project with the universities of Bath and Southampton (£2.85 million) to expand its Enterprise Centre to include activities at the other two universities – under the banner of the Wessex Enterprise Centre (WEC).
- A successful solo application to the Higher Education Innovation fund (HEIF) with an award of £656,000.
- A successful collaborative application, again under HEIF, involving Bristol, Bath, Southampton and Surrey with an award of £5 million to set up the SETsquared ([www.setsquared.co.uk](http://www.setsquared.co.uk)) project to support high growth, knowledge-based enterprises in Southern England.
- A successful collaborative application under the first round of the University Challenge Fund (UCF) involving Bristol and Bath universities, which resulted in a grant of £5 million to set up the SULIS seed corn fund ([www.bath.ac.uk/sulis-innovation](http://www.bath.ac.uk/sulis-innovation)).
- A successful collaborative application under round two of the UCF involving Bristol, Bath and Southampton to extend the SULIS fund, which received a grant of £4 million.

1.7 This series of applications and grants was used to develop a number of key initiatives within the University which enabled students and staff to undertake activities that would not otherwise have been funded within the University. In particular, the funding facilitated:

- The development of an entrepreneurial culture at the University
- Changes in organisational structure and governance
- A series of new initiatives such as enterprise training and business-university networking and events
- Growing collaboration with other similar universities

- Increased collaboration with industry
- Growing collaboration with other partners including regional organisations and initiatives.

1.8 However, all these sources of funds were managed by the University to provide a series of activities and initiatives that were managed by the University itself. From the users' perspectives, there is a seamless programme so that it is not apparent where the funding comes from, rather than a series of discrete separate Knowledge Transfer Programmes. The division of Research & Enterprise Development (RED) , as the University's department responsible for all of this activity is now known, undertakes separate management and accounting for each of the different programmes as required, thus making life easier for all of its 'customers'.

1.9 Because of the ways in which the Knowledge Transfer Programmes were managed within the University, this case study seeks to draw out the overall conclusions and impacts of the KTP activities as a whole rather than focussing on the impact of specific programmes.

#### **How were the funds and initiatives managed?**

1.10 A key initial decision was to bring together into a single department all the previously disparate functions related to enterprise development including the Industrial Liaison Officer, intellectual property, management of research contracts, equity spin-outs and Bristol Innovations Ltd. The resultant Research & Enterprise Development (RED) was established as a formal division of the University i.e. as a core function of the University.

1.11 This model is quite distinct from the management structures found in some other universities where enterprise activities have been developed as a separate company. There were three main reasons for the decision to develop the RED within the University:

- Having enterprise as a division of the University helps make this a core function (rather than having a separate company which would put distance between the University and the company), and so facilitates cultural change and involvement of staff and students.
- The structure enables RED to have freedom to do everything it needs to do, apart from set separate reward systems (since all staff are employed by the University and are paid on University scales, necessary to attract the appropriate people).
- RED ensures that synergies could be developed between all the enterprise and external facing activities of the University across a continuum of activities.

1.12 The main functions of RED were therefore designed to:

- Develop an over-arching strategy for research themes and infrastructures. Since the University is research intensive, it was considered important to provide a coherent and strategic framework incorporating issues such as intellectual property and research contracts etc. The University's research strategy is developed by RED in conjunction with the University's Research Committee.
- Support academics in raising funding from a variety of sources including industry, research councils, the European Framework Programme, charities, government and collaborative programmes etc.
- Provide contract support, particularly where guidance and advice may be required, for example in the case of a non-standard project where there may be important aspects such as Intellectual Property (IP) rights etc.
- Coordinate all bids including those related to IP or the Regional Development Agency (RDA), as well as incubation and science parks through an 'Enterprise Action Plan' (this is a very different process from that in some universities where an internal bidding round is undertaken before these are brought together as a single university bid, or where uncoordinated bids may be submitted from within the same university).

### **Management structures**

- 1.13 The introduction of the enterprise agenda as a 'third leg' of the University's activities has involved changes in its structures and decision making processes. This includes a number of different elements:

#### *Enterprise Advisory Board*

- 1.14 This is a Board composed of senior University staff and external advisers which is chaired by the Vice-Chancellor.

#### *Enterprise Task Group*

- 1.15 This is a group within the University which includes RED and 'Enterprise Leaders'. These Enterprise Leaders are academics who act as internal champions within their own departments and who deliver accredited enterprise education. The Enterprise Leaders are funded by Knowledge Transfer Programmes such as SEC for the time they spend on enterprise activities within their departments. They have a number of specific roles:

- Champions for enterprise
- An information conduit

- Delivering accredited enterprise courses such as those within the department of Engineering Management
  - Information audit for ideas, knowledge and possible enterprise initiatives
  - The first filter of ideas from within their departments
  - In some circumstances having an external role e.g. as a representative on external bodies such as the West of England Aerospace Forum.
- 1.16 The Enterprise Task Group has recently been made responsible to the Research Committee which itself has been restructured with Research Directors replacing the Deans who formerly sat on the Research Committee. This is seen as sending a very important cultural message about the importance of the enterprise function.
- 1.17 The seed corn fund 'Sulis' has been managed with assistance from an external firm of professional fund managers 'Quester'. An early decision by the University was to utilise specialist external professional management skills rather than to try to build up this capability within the University. This also enabled the Sulis fund to attract high powered individuals from companies and other funds to sit on an Advisory Board.
- 1.18 As a consequence, the Sulis fund is organised as a 'Limited partner fund' which is a legal partnership composed of two categories of partner:
- Limited partners (investors including the Universities of Bristol, Bath and Southampton)
  - General partner who, in this case, is the managing agent – Quester (there is no conflict of interest in Quester's role in the fund, since Quester does not have exclusivity and companies needing funding may go elsewhere).
- 1.19 The fund has an Executive, chaired by Quester, which is composed of the Director of Enterprise at the University of Bristol and equivalents from Bath and Southampton Universities. This group meets monthly and advises Quester about investment decisions. At this stage in the process, due diligence is undertaken with decisions about investments normally being reached by consensus, but with the final decision being made by Quester.
- 1.20 There is also an Advisory Board composed of external investment professionals which considers investment proposals and has general oversight of the General Partner (Quester).

## Collaboration arrangements with other universities

1.21 Bristol University has been involved in four Knowledge Transfer Programmes, three of which were collaborative and one solo project. These are illustrated below.

| Table 1.1: Bristol University Knowledge Transfer Programmes |                    |  |   |   |
|---|--------------------|--|---|---|
|   | KTP programme area |  |   |   |
|   | HEIF solo          | HEIF collaborative   | UCF   | SEC   |
| Participation   | *                  | *  | *   | *   |
| Name  |                    | Set 2  | Sulis   | BEC /WEC  |
| Nature of participation                                     | Solo               | Collaborative (Bristol, Bath, Southampton, Surrey) Set 2<br>S'ton lead | Collaborative (Bristol, Bath, Round 1)<br>Bristol, Bath, S'ton Round 2    | Solo round 1 - BEC<br>Collab round 2 - (Bristol, Bath, S'ton) - WEC |
| Amount applied for  | £656,000           | £5m  | £5m –round 1 extended to £9m round 2 (including £5m from round 1) 'Sulis' | £2.6m round 1<br>£2.85m round 2                                     |
| Amount awarded  | £656,000           | £5m  | £9m   | 2.6 round 1(BEC)<br>2.85 round 2 (WEC) – mainly for Bath and S'ton  |

1.22 Some of the key decisions in developing applications for funding were whether collaboration would be beneficial and, if so, which universities would be the most effective collaborators. Bristol initially applied under the HEIF and SEC programmes with solo bids, but subsequently, the SEC project was expanded in the second round to include Bath and Southampton universities. Bristol also applied for a collaborative HEIF project with Bath, Southampton and Surrey, as well as collaboratively under UCF with Bath (round 1) and both Bath and Southampton (round 2).

1.23 The main criteria for seeking collaboration with Bath, Southampton and Surrey included:

- These universities have a geographical coherence making management interactions easier (although some collaborations cover more than on RDA area)
- Each university was at a similar stage in its development of the enterprise agenda
- There was little to lose by collaborating (competition provided no advantages) and a lot to gain in terms of sharing knowledge and experience

- The universities formed a peer group of similar institutions with a clear focus on research as a core mission
- Each university had undergone a similar metamorphosis in the ways in which they were structured – in particular, each had made ‘enterprise’ a core function of the university rather than managing this function as a separate company
- The experience of working with Surrey under the HEIF 1 programme has enabled them to become full partners in the more integrated programmes under HEIF2.

1.24 The ability to develop synergies and the sharing of experience was an important consideration at the bidding stage. In particular, other universities such as Bath had specific skills in areas such as the management of intellectual property and the Teaching Company Scheme which were potentially beneficial to the other partners.

### **Collaboration arrangements with other bodies**

1.25 At the start of the enterprise agenda, the RDAs had only recently been established and the early RDA economic strategies made little reference to the role of universities. However, as the programme has developed, there has been more interaction with the relevant RDA for the region (SWRDA). In particular, the Vice-Chancellor of the University of Bristol now sits on the RDA Board and there is now closer collaboration with, for example, RDA representatives acting as an external point of contact (or sales force) for the University’s enterprise activities.

### **Impacts, outcomes and benefits**

1.26 The Knowledge Transfer Programmes have led to a number of important impacts both within the University and externally in areas such as culture, organisation, collaboration and education as well as in more specific enterprise initiatives such the provision of seed funding for spin-out companies. Some of the key impacts and outcomes are discussed below.

#### *Culture*

1.27 The Knowledge Transfer Programmes have had a major impact on the culture and organisational structure of Bristol University. In particular, the University’s goals as elaborated recently by the Vice-Chancellor now refer to enterprise as one three key activities under the strap-line ‘Learning, discovery, enterprise’.

1.28 The University’s structures and decision making processes have been developed over the past five years to accommodate the growing emphasis on the enterprise agenda. The organisation and governance of the University now integrates enterprise as a core activity.

### *Collaboration*

- 1.29 The University has now developed strong collaborative arrangements with four regional universities and has gained from the sharing of experience and expertise. Collaboration has also increased with bodies such as the RDA, the West of England Aerospace Forum and with local industry.

### *Education*

- 1.30 There are a large number of accredited courses with enterprise elements and there are eight enterprise leaders in place at the University of Bristol. The aim was to embed enterprise within courses with these modules remaining optional – overall some 10% of students have taken these options, with the highest uptake in engineering.

### *Seed funding*

- 1.31 The Sulis seed fund started with an investment of £5 million which was subsequently increased to £9 million in the second round of funding. So far, the fund has invested over half this capital and has £4.4 million left to invest after some of its earlier investments have been realised. Using the valuation methodology adopted by the BVCA, the fund is now estimated to be worth £9 million.
- 1.32 The prognosis for the fund is unlikely to show a major capital gain or develop an endowment for the benefit of the University in the future. At present, the main emphasis of the Sulis investments is to achieve economic development rather than capital growth. However, in the longer term, the fund managers are optimistic about the potential.

### **Problems and key issues**

- 1.33 A number of problems and issues have limited the benefits that might have been achieved from the Knowledge Transfer Programmes:
- The resource load involved in the bidding process for the initial funds was excessive, although it is recognised that the more integrated approach adopted for HEIF 2 should ameliorate this problem
  - The two year time frame available for funding makes it more difficult to secure staff who would prefer longer term employment rather than fixed term contracts and the uncertainty caused by the bidding process
  - The ‘first investor’ rule for funding using UCF funding limited the opportunities for Sulis to fund companies that had possibly already received funding from another source e.g. a business angel

- The cap on investment for a single firm of £250,000 under the UCF rules limited the ability of Sulis to provide follow-on funding for successful projects and also introduced an artificial limit for the quantum level required for an individual investment (which is normally considered to be some £500,000 in the Venture capital sector).

### **Additionality**

- 1.34 Without funding under the Knowledge Transfer Programmes, it is unlikely that any other sources of equivalent funding for these activities would have been found, in particular, any funding from the University itself would have been likely only for a single project rather than for core strategic activities. As a consequence, the enterprise agenda at Bristol University would only have developed at a minimal level.

### **Key lessons learned**

- 1.35 The following lessons were learned:
- The importance of culture change in building the ‘third stream’ activity of enterprise
  - The importance of building enterprise into the core activities and structures of the university – need for organisational and governance change to reflect the developing influence of enterprise within the university. In particular, it was important to build enterprise into the research strategy
  - The importance of collaboration with peer universities
  - Users of enterprise are not interested in the mechanics of specific schemes – more interested in a seamless web of support that enables them to achieve their enterprise objectives.

### **Conclusions**

- 1.36 Bristol developed from a fairly low base in relation to enterprise activities. Therefore the availability of the initial Knowledge Transfer Programme funding provided additional credibility and resources for those in the University who were in the vanguard of seeking to establish enterprise as one of University’s three key activities. Developing enterprise as department which is fully integrated into the University seems to be working well for Bristol.

## **2 Cardiff University**

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### **Background**

- 2.1 Cardiff University is by far the largest research based university in Wales and a major university within the UK. It has 5,000 employees and 22,000 students. Its Mission is to gain recognition as a world class research institution, making a significant contribution to the economic, educational and cultural life of Wales and building long term mutually beneficial links with industry and commerce.
- 2.2 Cardiff University is an independent University institution, granted Royal Charter in 1883 and formerly part of the University of Wales, it reached its present form as a result of the merger in 1988 of the University of Wales Institute Of Science and Technology (UWIST) and the University College Cardiff and merger with the University of Wales College of Medicine in 2004.
- 2.3 The University of Wales College of Medicine, which is also located in Cardiff, has complementary specialisations. Cardiff University has its own degree awarding powers.

### **Reasons for applying to the Knowledge Transfer Programmes**

- 2.4 At the time that the Knowledge Transfer Programmes were being introduced, the University was eligible for UCF and SEC but not for HEIF funding. The University did not apply for SEC funding on the grounds that it did not believe that a financially sustainable case could be put forward, but did apply for UCF.
- 2.5 At the time of the application, the University had a technology transfer activity dealing with IP, licensing etc but little venture capital and fund management in relation to helping spinout companies with funding. The main objective in applying to the UCF was to establish a fund to encourage and support spinout companies originating in the University to establish themselves as viable businesses.

### **Applications within Knowledge Transfer Programmes**

- 2.6 Cardiff has participated in one area of the Knowledge Transfer Programme through a collaborative award with the University of Wales College of Medicine (UWCM) pre-merger. In addition to the £3m from the UCF, the two partner institutions contributed an additional £1m.

## **Activities undertaken with the funds**

2.7 The Knowledge Transfer Programme funding provided an opportunity for the University to build on its activities in patents and IP and to add value to these activities through funding to help and facilitate new spinouts and to improve the University's knowledge transfer infrastructure. The UCF funding allowed these activities to be moved up a gear through:

- access to external professional advice
- financial assistance to exemplify technologies e.g. with prototypes
- increased spending on patents
- seed funding for spinout companies.

## **How were the funds and initiatives managed?**

2.8 Cardiff University currently has a 'Research and Commercial Division' headed by a Director who reports to the Director of the Strategic Development Directorate. Within this Division, the main responsibility for Knowledge Transfer lies with the Deputy Director, Commercial Development. The Division is part of the administration of the University.

2.9 The Research and Commercial Division itself acts as a one stop shop to assist research staff in areas such as:

- finance (costing and pricing research proposals)
- legal (research and services contracts)
- European funding
- research development
- business services
- technology transfer

2.10 The Division has a number of people who have joint responsibility for helping people with their research proposals etc and for looking out for technology transfer possibilities. The objective is to help researchers achieve the University's mission to grow the research base and, by developing a thorough understanding of what researchers are doing, to help identify opportunities for technology transfer. This is achieved, mainly, by employing people who specialise in particular departmental science and technologies and by providing such staff with a joint research development/technology transfer remit.

- 2.11 Within the Division, there is also a 'Business Services Group which assists with:
- interactions with business for use of University equipment
  - consultancy
  - Cardiff University Innovation Network – with 3,000 members, mainly from industry.
- 2.12 The Research and Commercial function is separate from the strategic activities of the Research Committee which deals with:
- research strategy
  - allocation of funds relating to specific initiatives
  - RAE
  - academic school research targets and strategic plans.
- 2.13 Currently, the Research Committee does not deal specifically with technology transfer issues although an Innovation and Engagement Board has been established to develop the University's 3<sup>rd</sup> Mission strategy .

***Management of the UCF funds***

- 2.14 Initially, external fund managers were employed to manage the fund who were included in the application because of their expertise and because they brought a local fund management presence.
- 2.15 However, this arrangement did not lead to the level of investments expected because:
- the fund manager's unfamiliarity with some of the technologies
  - the fund manager's unfamiliarity with university procedures
  - at times the decision making process was slow
  - the fund managers appeared averse to investing in early stage projects to develop technologies.
- 2.16 As a consequence, the level of investment made in the early period was very low and, from April 2003, a decision was taken to take fund management in-house.

- 2.17 The fund is still managed as a Limited Liability Partnership with Cardiff University as the limited partner and, Cardiff Partnership Fund Ltd (a company limited by shares) acts as the general partner. Pre-merger, the fund did not allocate funding between the two institutions, but allowed projects to come forward from either and were assessed on merit.
- 2.18 The fund is managed by a board with 2/3 representation from outside the University. The Board is unpaid and includes:
- Chair – the ex Director of MRCT
  - Cardiff University’s Director of Physical and Financial Resources
  - Chair of Cardiff University’s Council
  - senior local business people
  - representative from a local corporate finance house that provide advice on fund investments in spinout companies
  - the Chair of the Welsh Development Agency.
- 2.19 The Board has two main functions which are managed through separate meetings:
- overseeing the legal and fiduciary rules of the fund
  - reviewing and advising on proposals for projects at various stages e.g. new proposals, progress of existing projects, second stage applications.
- 2.20 Members of the Board sometimes act as Directors of spinout companies and may also act as direct investors in some of these companies (the CPF Ltd Board has a ‘Conflict of Interest’ procedure to govern such arrangements).
- 2.21 The external business people on the Board are all chosen as individuals who have been successful in starting and/or growing high technology businesses and play an active role in the management of the fund particularly since the fund has been taken in-house, providing:
- a reality check with regard to potential investments
  - help with connections / networks
  - potential investment in their own right.

- 2.22 Direct day to day responsibility for the administrative management of the fund is undertaken by the University's Deputy Director, Commercial Development. Currently there are 51 staff in the Division including those responsible for the financial administration of grants and contracts and other admin staff. There are 8 people who are focussed on technology transfer and research development. Project proposals are put forward to the Board after the Research and Commercial Division has worked with the relevant academics to identify and develop ideas into proposals. Decisions on projects up to £10k may be made by the Board Chairman, Deputy Director Commercial Development and one other Board member. Larger proposals go to the full Board for advice.
- 2.23 In practice, spinout companies are developed and assisted to the point where they have an effective business plan. For many spinouts, the main activity and use of UCF funds is in identifying, recruiting and funding a CEO/management. An additional check on the viability of the new company's business plan is the willingness of such potential CEOs to join the spinout company. Funding is then provided to enable the newly recruited CEO to take the work to the next stage (e.g. possibly further fund raising).
- 2.24 The criteria used to determine whether an investment proposal should be approved include:
- the quality of the science
  - an ability to build an IP position
  - market potential
  - stage of development (e.g. whether a suitable CEO is in place).
- 2.25 The Board has developed broad principles regarding the preferred model for the development of spinout companies involves which include:
- the development of an idea into a robust proposal,
  - the relevant University staff member (supervisor) remaining in the University, but acting as an advisor to the company, possibly through the SAB
  - the post doctorate involved in the new company/concept moving out with the project (very often this is facilitated by the fact that the post-doc may be on a short term university contract)
  - engagement of an experienced CEO.

- 2.26 In the early 1990's, the University's Council and its sub-committees were involved in approving spinout company business plans on making extremely long winded. More recently, this responsibility has been delegated to , the University's patent and licensing (UC3 Ltd). UC3 is a company limited by guarantee was founded in 1979 and is controlled by the University since all its directors are full-time University staff. The company provides an interface between the University and the outside world in relation to IP and a vehicle for housing patents and equity in spinout companies. All the university's IP is assigned to UC3 and the company also holds equity in university spinouts. This provides a very useful vehicle for dealing with other companies (licensees) etc. In practice, the University Council relies on UC3 to work out all the details of IP ownership and other issues in a practical and businesslike way.
- 2.27 The University maintains its interest in spin-out companies through:
- representation by the Division on the company board
  - the founding directors.
- 2.28 Monitoring is undertaken through the fund's monthly Board meetings. There is schedule planned through the year and particular company managers are brought in to report to the Board. Annual reports are produced for Cardiff University's Council.
- 2.29 There is also a requirement to report to the Wellcome Trust. This is because some of the UCF monies were provided by the Wellcome Trust and has to be spent according to the requirements of the Trust. Out of the £3m external funding received by the fund, some £1.8m came from Wellcome. This was because of the strongly life science nature of the two institutions. In practice, a large proportion (over 50%) of the funding of projects by the fund seems to have been in the life sciences and bioscience areas.
- 2.30 A number of metrics are used by the Division in its own internal targets and in assessing the performance of staff. Hard metrics include:
- how much licensing income brought in
  - how many spin out companies have been created
  - how much research income has come in on the back of a licensing deal (e.g. the company agrees to fund research as well as pay licence fees/royalties)
  - how much third leg funding has been brought in from government initiatives (DTI etc).
- 2.31 Some softer metrics include:

- number of patents filed
- confidentiality agreements concluded
- new technology disclosures.

### **Collaborative arrangements with other universities**

2.32 Both Cardiff University and the former College of Medicine (UWCM) had a prior history of collaboration in areas such as:

- joint patents
- spin out companies
- the DTI's BEP programme
- Wales Spinout Programme

2.33 Whilst pre-merger Cardiff University was about four times larger than UWCM there was complementary activity and scope for synergy since:

- UWCM focussed on bioscience/medical with a strong clinical strength through its teaching hospital
- Cardiff has expertise in bioscience, pharmacy and optometry.

2.34 The UWCM had a small department dealing with technology transfer which has now merged with Cardiff's department.

2.35 The UCF proposal was collaborative from the start because the two universities had worked together over a considerable period of time and had:

- complementary interests and technologies
- some joint patents
- spinouts in common
- shared experience of collaborating on the DTI's BEP programme.

2.36 The main reasons for collaboration within the UCF application were therefore:

- experience of previous successful collaboration
- the potential wider science base and complementary skills and resources e.g. UWCM close association with the clinicians' and patients' needs

- to achieve a critical mass
- close proximity making further collaboration easier.

2.37 Prior to merger there was further collaboration through the 'Wales Spinout Programme.

### **Collaboration with other bodies**

2.38 There is some involvement with the WDA whose Chairman sits on the Fund Board and there have been efforts to dovetail with what WDA is doing. However, the main benefit appears to be in allowing the WDA to see what is going on in the technology area and facilitating their efforts to develop follow-on activities where relevant e.g. through the Finance Wales programme (only available for Objective 1 areas which excludes most of Cardiff City).

### **Impacts, outcomes and benefits**

2.39 It has taken some time to get this initiative up and running after a slow start and there is currently still some funding left from the UCF. The fund has been very careful and prudent in its investment policies. This year it has invested about £900,000 and levered in a further £1m in co-finance from private venture capital/angel funds. The fund is not fully spent, but is likely to be so in a short time since it is now down to its last £1m. It has invested in 32 projects of which nine are spinout companies (some of which have had more than one tranche of funding). Most of this funding has been in return for equity.

2.40 At present, many of the companies in which the fund has invested are not yet profitable and it is too early to ascertain whether the fund will eventually become self sustaining. There are some dividends and some licensing income. The fund receives technology transfer income e.g. any profits, licensing income etc. However, this is not sufficient to make this self funding in the short term. At the current stage, no investments have been realised but the prospects of being able to exit from some of the fund's investments is realistic.

2.41 However, the goal of having an endowment that will pay significant funds to the University is still a long way away. In particular, it is not yet obvious when an overall exit strategy could be realised.

2.42 There are expectations of eventual success in the establishment of an endowment to benefit the University which is the eventual goal of the portfolio of investments made. The infrastructure is now in place and there are no major gaps in the University's knowledge transfer activities. This includes policies, people etc. Following merger, there is also a more well established structure to support technology transfer.

2.43 The activities of the fund have increased the number of ideas that are being brought forward and this can be measured by the amount of technology transfer activities which has increased since the fund was established.

- 2.44 In addition, the activities of the fund have stimulated others to become actively involved especially VC's. In particular, the fund has made Cardiff better able to attract in external funding which is currently running at about the same amount of co-funding.
- 2.45 The only potential caveat relates when the existing fund begins to run out of UCF funding. This is a significant problem because the University is not eligible for HEIF2 because it is in Wales and any of the possible alternatives based in Wales do not seem likely to provide the type of funding required.
- 2.46 Cardiff University will submit its Third Mission Plan to the Welsh Funding Council in September 2004. However, it is unlikely that there will be any specific UCF type funding available in Wales for the current UCSFs in Wales (Cardiff and Aberystwyth). Cardiff will have to bid for funds from any new scheme alongside other institutions in Wales. Also any funding arising from this source would not be for same objectives as the UCF.

### **Key issues and problems**

- 2.47 The fund initially had a slow start under the management of external fund managers. In addition, the ability to realise investments either through profits or exiting from companies has been slow. The availability of further follow on funding from the Knowledge Transfer Programmes is limited to those initiatives based in Wales. The UCF £250,000 limit has constrained investment ability and also constrains the fund's ability to recruit a good CEO. The 250,000 rule there is a risk of dilution when external financiers bring in follow on funding.

### **Additionality**

- 2.48 Without the UCF programme all the activities undertaken would have been much reduced in scale. There are some funds available through the WDA e.g. Knowledge Exploitation Fund (KEF), but these are nothing close to the UCF funding – in particular, they tend to be spread thinly and focus on Objective 1 areas only. As such there are few other sources of funding available.
- 2.49 Without the funding there would only be less funding available for patenting and legal advice.

### **Key lessons learned**

- 2.50 Cardiff has learned through experience:
- that the original approach of working with external fund managers was not effective
  - that there are few other sources of funds available in Wales for such activities

- that investments in spinout technology based companies may not be realisable for a long time
- that there are good potential opportunities for synergistic collaboration with other institutes with complementary technologies and fields of expertise.

## **Conclusions**

- 2.51 The Cardiff example illustrates some of the difficulties that can occur when two very different sectors (venture capital and academia) are compelled to work together under a specific initiative and that the initial management structure had to be amended in order for the University and the fund to achieve their objectives.
- 2.52 Although the development of the in-house management approach required considerable learning and development of processes and procedures, this expertise is now embedded within the University's Research and Commercial Division for the longer-term. However, this investment in knowledge transfer infrastructure is unlikely to be self sustaining in the short term.

## 3 i10

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### Background

3.1 i10 is a collaborative project between Higher Education Institutions in the East of England which aims to improve the interface and engagement with business and other organisations through funding, collaboration, facilitation and networking. The project was originally known as the Regional Infrastructure for Innovation (RII), but was rebranded as i10 in 2003. The project now involves every HEI in the region and is, perhaps, the most diverse grouping funded under HEIF 1<sup>1</sup>. Only one member of i10 (the University of Cambridge) was visited during the evaluation and this case study does not attempt to reflect the detailed impacts on individual members<sup>2</sup>.

3.2 i10 has four primary aims:

- maximising business innovation through partnership – by continuing to focus on delivering sets of practices and services, which its HEIs and business groups will want to embed and sustain beyond 2006
- providing opportunities for knowledge sharing and collaboration among the regions HEIs, local business and industry – by acting as a prime coordinating body for helping to shape regional strategy with other stakeholders (such as EEDA and the Science and Industry Research Council)
- providing access to HEI expertise and services – by continuing to develop, support and maintain the current networks and services within the i10 community
- supporting and encouraging individuals within these universities and colleges to engage effectively with the regional business community – by effectively promoting and showcasing the range of technologies their academics have to offer.

3.3 The partners also have a wider set of expectations for i10. These include:

- promoting HEI capabilities and shaping institution's offerings/capabilities
- increasing awareness of HEI expertise, services and facilities in the region

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<sup>1</sup> The i10 partners are: Anglia Polytechnic University, Cranfield University, Norwich School of Art and Design, The Open University in the East of England, the University of Cambridge, the University of East Anglia, the University of Essex, the University of Hertfordshire, the University of Luton, and Writtle College

<sup>2</sup> We were, however, able to discuss i10 with some of the project managers and regional stakeholders.

- developing knowledge and skills of academic staff in applying expertise for business use
- developing knowledge and skills of academic-related staff in relation to 3<sup>rd</sup> stream activities
- developing 'joint venture' proposals with other HEI partners
- exploring partnerships with other regional agencies
- gaining a better understanding of the region's clusters and activities.

### **Reasons for applying to the Knowledge Transfer Programmes**

3.4 Each i10 member had its own individual reasons for participating in the project but there seems to have been a shared view of the need for regional collaboration reflecting:

- A perception that regional issues needed to be addressed collaboratively, otherwise the response from the HE sector was likely to be fragmented and less effective than it might otherwise be
- Recognition that, with the increasing importance of 3<sup>rd</sup> stream activities, all HEIs would need to develop new modes of knowledge transfer and that this development activity could be more effective if undertaken collectively.

3.5 While collaboration was recognised as a response to regional issues, it would not have taken place without HEIF funding. New management structures needed to be established, especially given the diversity of the partners. In addition, there was no previous history of joint working between many of the members and the prospect of additional funding was necessary to attract them into a collaborative venture.

3.6 Most i10 members received funding from other KT programmes, and also other funds from HEIF1, and in some cases these were substantial. We think it likely that this support may have enabled members to participate more fully in i10<sup>3</sup>, but i10 was not specifically planned to complement these projects.

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<sup>3</sup> As mentioned above, only one member was visited during the valuation.

## **How were the funds and initiatives managed?**

- 3.7 i10 identified two key issues which it needed to address in the initial phase of activity. First, to ensure transparency in the allocation of HEIF funds between members. It was recognised that members would only embrace fully collaborative ways of working if they felt that the allocation of resources reflected project aims, and that institutions were being fairly treated. This was especially important given the limited history of collaboration between members, but disparities in size, income and missions were also a major factor. As a result, there was no prior allocation of HEIF funds between members. Instead, proposals for funding are submitted to the management group and assessed against i10 objectives. Successful applications are monitored against specified deliverables and all members have open access to financial and management information.
- 3.8 Second, i10 wished to identify how the collaboration could contribute most effectively to the region rather than simply enabling members to do more of the same as individuals. There was a need to identify gaps in provision, understand how the project could meet these needs, identify (collaborative) roles for members, and mobilise responses from within the institutions. This in itself was a large scale exercise.
- 3.9 One component of developing i10 strategy entailed aligning i10 priorities with those of the RDA. This began with an audit of members' capabilities and a matching of these against RDA sector priorities. The project did not seek to become involved in all but selected nine sectors where several members were active. For each of these, a 'sector champion' has been identified (see below).
- 3.10 The i10 management and operational structure is as follows:
- A Chair person. Originally the chair revolved between the members on a sixth-monthly basis and this was considered helpful in getting buy-in from the members. However, once the initial systems and infrastructure had been established there was need to concentrate more on external delivery. A permanent (PT) chair was appointed. The Chair is from the private sector, with extensive experience and knowledge of the Eastern Region, and the appointment is considered to have been instrumental in focusing the project towards external delivery
  - A steering group comprised of pro vice chancellors and heads of research services. This is the forum for strategic collaboration and policy making
  - A management team comprised of commercialisation staff. This is the forum for operational collaboration and policy implementation
  - Working Groups for detailed assessment of needs and monitoring of projects

- A full-time project manager
- Sector champions for each of the 9 sectors. These are PT appointments, mostly from the private sector. Their role is to develop sector networks and to inform i10 on sector requirements.

3.11 In the first phase of its activities, i10 devoted significant effort to designing systems and procedures which may have slowed progress in achieving tangible outputs. However, it is seen as an essential component of the infrastructure and something which has engendered mutual trust and promoted joint working between the members.

### **Collaboration arrangements with other bodies**

3.12 i10 has both strategic and operational links with regional organisations. The main strategic links are with the:

- RDA. i10 is emerging as the strategic partner for regional universities in the sphere of economic development, innovation and business support –“*EEDA’s thinking around its innovation strategy and the development of support to innovative businesses is predicated on i10’s role as a co-coordinating body and its input to EEDA’s decision-making processes*”<sup>4</sup>
- Association of Universities of East of England (AUEE), with which i10 collaborates on KT activities

### **Impacts, outcomes and benefits**

3.13 i10 has launched a number of initiatives which it classifies as *HEI services* and *Business Sector Projects*. These are described below.

#### ***HEI services***

3.14 *i10 web site*<sup>5</sup>: This is the public face of i10. It was launched in October 2003 and has over 2500 registered members from business and academia. It contains about 3000 content items including news, events, member profiles, support for nine industry networks and access to the HEI services offered through i10. A full time commissioning and content editor has been engaged to keep the content alive and up to date.

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<sup>4</sup> Extract from EEDA letter supporting i10’s HEIF 2 application.

<sup>5</sup> [www.i10.org.uk](http://www.i10.org.uk)

- 3.15 *Ask i10*: This is a brokering service where users (typically a business in the region) can present a question or query to i10 that is then automatically distributed to all HEIs in the collaboration. The service also supports the management of responses to the original query according to a policy agreed by all the participating HEIs. The service solves the obstacle of not knowing which institution to approach or which can best provide the solution, and not knowing exactly who to contact within the institutions. This was cited as an example of good practice in the Lambert Review as no similar service existed before i10.
- 3.16 *Recruitment*: i10 brings together ten HEI careers offices in the region in order to provide a regional service to students and employers called GradsEast. It facilitates employers in graduate vacancies and placements across the whole region and it will support students in finding employment and placements. i10 has also funded two posts in Creative Enterprise Centres which are designed to help the graduates find employment (or self employment) within the East of England.
- 3.17 *Regional Expertise database*: The i10 web site currently provides a regional database and search mechanism that combines the individual expertise databases of all the i10 institutions that have one. It also provides a mechanism for posting expertise information onto the i10 site for those institutions that do not have their own database or for those that want to promote their local experts at the regional level
- 3.18 *Learning*: Seven on-line learning modules into different aspects of innovation have been developed by i10 and are available for business use free via the i10 web site. A further seven in manufacturing and two in drug discovery are currently in production. There are plans to develop up to 20 other modules targeted at the nine vertical business sectors.
- 3.19 *Facilities*: More than 250 facilities and services offered by the individual i10 HEIs have been identified and contact information made available through the i10 web site. These range from scientific instruments (e.g. DNA Sequencing) through to community facilities (e.g. sports facilities). Many of these facilities are offered as part of a broader service (e.g. expertise and technical support). An educative pack has been developed to help HEIs commercialise their facilities.
- 3.20 *Intellectual Property*: Support is being provided to all the i10 HEIs business development and technology transfer offices in the management of intellectual property and setting up structures and processes to facilitate its better exploitation. A special interest group of HEI Technology Transfer staff has been formed and best practice models are being developed and disseminated. Where appropriate, details of available IP are being posted to a European database through the Innovation Relay Centre. Approximately 30 new technology offering have been identified and are at various stages in the path towards commercial exploitation.

- 3.21 *Collaboration:* Apart from the general support for collaborative projects between industry and HEIs there is a specific initiative to develop a network of Innovation Laboratories (iLabs). A scoping study is complete and development of the network is in progress. The relationship building between the i10 HEIs, business support agencies, and industry associations (ERBI, MAS, EMMA, EEEGR, UK CEED, SJIC, EnviroLink UK, Trade Partners UK and Business Links) is also well advanced with most of these groups acting as champions for i10.
- 3.22 *Enterprise:* i10 is providing bursary funding to 12 people in the region who are starting new businesses. These 'Enterprise Fellows' were selected from over 100 applicants and are located at three of the i10 HEIs. The Fellows are supported with training, mentoring, office facilities and access to university resources. i10 has also pulled together the combined expertise in entrepreneurship training across the region and produced a pack called 'Train the Trainers' to help increase the capability to supply entrepreneurship training where it is needed.
- 3.23 *Funding:* Several new regional groups have been created or supported by i10 to help make it easier for businesses to access funds for engagements with HEIs through schemes such as Knowledge Transfer Partnerships, STEP, and the EU.
- 3.24 *Intranet:* The project intranet is a repository of several thousand documents including project plans, project deliverables, templates, financial reports, meeting minutes, guidance materials, web links, and a directory of project staff. This has been a critical resource in the efficient and effective operation of the project and has been a key to facilitating information sharing and collaboration amongst the 100 or more people that contribute to the project.

### ***Business Sector Projects***

- 3.25 While the above provide a set of generic support services there are also many specific industry focused projects. Specific examples include:
- *Expertise guides:* Expertise guides are targeted at industry sectors and bring together in one place information about research, consultancy, facilities, case studies, courses, expertise and events being offered by the i10 HEIs. Expertise guides are distributed at industry sector events, by mail and via the i10 web site. Expertise guides for Energy, Environment, Rural, Manufacturing, ICT and Multimedia and Biotechnology have been developed so far. Several others including Food and Drink and Autosport are in preparation
  - *Biotechnology:* 58 biotechnology facilities and over 900 experts have been identified across the i10 HEIs. Dialogue has started with over 60 companies in the region in order to showcase biotechnology facilities and services and gather more information on requirements these companies have of HEI services. i10 and Eastern Region

Biotechnology Initiative (ERBI) are working closely together and i10 co-sponsored the annual ERBI event

- *Manufacturing:* An online facility for companies to assess their innovation 'score' has been built. In cooperation with partners a consolidated database of manufacturing companies in the region has been built with over 6000 entries. These companies have been mailed the manufacturing expertise guide and invited to assess their innovation score. Close links have been established with the Manufacturing Advisory Service (MAS) and several documents have been produced providing help to manufacturers in a range of subjects and pointing them to capability within the HEIs.
- *ICT and Multi-Media:* Several successful events have taken place in Hertfordshire, Cambridge and Chelmsford involving over 800 delegates. Processes have been established for identifying and helping exploit IP in this area (especially in relation to software systems) and several examples of IP have been identified and are being publicised to help their exploitation.

#### ***Benefits to members of collaboration***

- 3.26 There are many ways in which collaboration has conferred benefits on i10 members. First, there are examples of joint working on specific knowledge transfer activities where partners have brought complementary expertise and experience. This has enabled i10 to deliver services which a single member could not.
- 3.27 Second, KT expertise has been shared between members. Networking between commercialisation staff has been valued, especially for those institutions where commercialisation tends to be isolated from mainstream academic activities. There are also examples of members providing specific expertise to others with no previous experience.
- 3.28 Third, and perhaps most important, i10 has become a vehicle for HEIs to engage more effectively with regional KT issues. There are a number of dimensions to this:
- As mentioned above, it is increasingly viewed by the RDA as a strategic partner enabling members to communicate more effectively than they could do as individuals
  - The i10 banner has become established in the region, facilitating the promotion and marketing of members' capabilities
  - i10 is a vehicle for bringing together institutions with widely different missions and strategies and provides an opportunity for institutions, which would not collaborate on a bilateral basis, to work together. As well as assembling complementary expertise, this enables some institutions to tap into national initiatives which they would otherwise find difficult to access.

## **Key issues**

- 3.29 As mentioned above, much of the initial phase of activity has been concerned with establishing the infrastructure and mechanisms for collaboration. KT initiatives have been successfully established but the volume of activity they have so far generated is not commensurate with the resources devoted to them. The key challenge for i10 during the next phase of activity is to capitalise on the infrastructure it has created.
- 3.30 The project applied successfully to HEIF 2 for knowledge exchange funding and activities will continue in the immediate future. Over the longer term, the structure and governance of i10 will need to be addressed. It is a project with defined targets and limited funding and regional universities, and other stakeholders, will need to decide on the most appropriate structure for i10 and its operational financial relationships to individual HEIs.

## **Conclusions**

- 3.31 i10 is an interesting example of a HEIF collaborative project because of the diversity of HEIs which are involved. It also has an explicit regional focus, although it shares this characteristic with a number of other projects. Reflecting this diversity, significant efforts were devoted to establishing mechanisms for collaboration. This has delayed the extent to which tangible impacts on the business community have been generated but, i10 would argue, this was a necessary condition for successful collaboration. It illustrates the long time scales which may be involved in establishing significant KT initiatives from scratch. The management structures are now in place, mutual confidence amongst the partners has developed and i10 has positioned itself as an important regional player. The balance of activity has already shifted towards delivery and this will be the main focus during the next phase of activity.

## 4 Imperial College

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### **Background**

4.1 Imperial College is the largest applied technology university in the UK and the largest UK academic institution in terms of turnover (£310m in 1997/8) and research income (£120m in 1997/8). The College has a unique Royal Charter which justifies its research environment ‘especially in its applications to industry’. In addition, the College has developed its synergies for technology development through a strongly interdisciplinary research base.

### **Reasons for applying to the Knowledge Transfer Programmes**

4.2 At the time that the Knowledge Transfer programmes were being introduced (1998), the College had developed some of the infrastructure necessary to facilitate the dissemination and exploitation of new technologies including:

- a technology development company called ‘Imperial College Innovations’ with a staff of 12 including 8 staff who managed the intellectual property portfolio resulting from the College’s research activities
- a dedicated biotechnology creation and mentoring company called ‘Imperial College Company Maker’ which had been part funded under the DTI’s BMI Awards
- a College consulting company called ‘ICON’ which earned some £5m per annum in consulting revenues.

4.3 However, the College did not have a seed fund and this was an important gap given the high level of technology available in the College and a major obstacle to getting new businesses up and running. In addition, it was also recognised that there was a need for much greater development of an entrepreneurial culture throughout the College’s activities, including both staff and students.

4.4 To quote Susan Searle, the Managing Director of Imperial Innovations – ‘Imperial College has always had an extremely strong science and technology base leading to a huge array of intellectual property rights. The Knowledge Transfer programmes have been a key resource in enabling us to translate this into new company formations and real benefits’.

## Applications within the programmes

4.5 Imperial College applied successfully for two of the main Knowledge Transfer Programme areas:

- the University Challenge Fund where the College put in a solo bid of £6m and was awarded funding of £3m. This bid was larger than the guide amount (£5m) and was justified by the College on the grounds that Imperial is one of the Country's major technological universities and required a larger sum to optimise its ability to develop and exploit these technologies
- the Science Enterprise Challenge fund where the College put in a solo bid for £2m and was awarded £2m.

4.6 The overall development of these two programmes including subsequent funding from other sources is illustrated in the following table and in this case study, we focus on the seed capital activities within the UCF programme area.

| <b>Table 4.1: Imperial College Knowledge Transfer Programmes</b> |                     |                    |  |                              |
|--|---------------------|--------------------|--|------------------------------|
|  | KTP programme areas |                    |  |                              |
|  | HEIF Solo           | HEIF Collaborative | UCF<br>£m  | SEC<br>£m                    |
| Participation  | No                  | No                 | *  | *                            |
| Nature of participation  |                     |                    | Solo   | Solo                         |
| Amount applied for   |                     |                    | 6.0  | 2.0                          |
| Amount awarded   |                     |                    | 3.0  | 2.0                          |
| Additional funds   |                     |                    | 1.0 (I.C.)<br>.05 (BAe)<br>.10 (Psion)                       | 0.5 ( corporate sponsorship) |
| Total  |                     |                    | 4.15   | 2.5                          |
| Amount spent   |                     |                    | In July 2003, the fund reported that it was 'fully invested' |                              |

## Activities undertaken with the funds

4.7 The scope of the activities undertaken under the Knowledge Transfer Programmes covers all of Imperial College's activities, but focussed in particular on two main areas of technology:

- engineering and IT
- biotechnology and medicine.

4.8 The funding from the KT programmes was used to fund a number of key activities, in particular to:

- establish the fund
- generate and assess proposals for funding
- manage investment.

#### **How were the funds and initiatives managed**

4.9 The University Challenge Seed Fund is managed by Imperial Innovations Ltd – a wholly owned subsidiary of Imperial College (rather than by an external fund manager). Its objective is to find and develop new companies at the seed stage of their development within the College. The fund is divided into two main tiers:

- Pathfinder projects which as for up to £25,000 to enable a range of activities to be undertaken including scoping out the idea, developing a business plan, developing prototypes, technical work and initial commercial work
- seed investment projects which can be up to £250,000 or £225,000 if Pathfinder funding has already been provided.

4.10 There is an internal management structure which includes a ‘Fund Manager’ who reports to the Managing Director of Imperial Innovations. There is also an Advisory Board composed of external advisers including fund managers, industrialists and entrepreneurs, which is Chaired by David Potter of Psion.

4.11 The Advisory Board set out the initial rules and processes through which the investments would be made. This included:

- a structure of two sub committees composed of board members, one specialising in engineering, science and IT and the other specialising in medical and life sciences
- delegation of a sum of money (maximum £0.5m at any one time) to each sub-committee for investment in major projects during that period
- delegation of authority to the Fund Manager of funds for Pathfinder projects following approval by the Managing Director within a maximum of £100,000 during any one period.
- a requirement for decisions about investment in a particular proposal to be by majority
- a requirement for approved investment to have defined milestones

- a process of Board level review of all investments at regular intervals to assess progress against milestones
  - the College's Finance Director having a role in the financial aspects of the fund (rather than in investment decisions).
- 4.12 Advisory Board members are not paid, but some members are paid fees by the companies on whose boards they sit. In addition, Advisory Board members are sometimes provided with options by companies and, on occasions act as Angels investing in companies.
- 4.13 In addition to the Advisory Board, a process for developing proposals for investment by the Fund was established which included:
- the Fund Manager working with the Technology Transfer executives to work up suitable propositions into more developed proposals
  - initial vetting / approval of proposals by the Managing Director of Imperial College Innovations and relevant Technology Transfer team heads
  - assessment of proposals by the appropriate sub-committee of the Advisory Board which met approx three times a year and were empowered with delegated authority to commit funds
  - a requirement for the Fund Manager to bring the project back to the sub-committee if there were any substantial changes to the project plan or if milestones were not being met.
- 4.14 A set of eligibility criteria was also established to facilitate decision making about possible investments by the Seed Fund. These included:
- projects should be technology based, generally with significant IP and a USP
  - there should be no pre-allocation to particular departments/ technologies etc
  - the fund was available to all Imperial departments with projects that could meet the other criteria i.e. projects that were mainly about property development were not eligible.
- 4.15 Seed funding for projects was made in two main modes:
- loans which were convertible to equity
  - equity.

4.16 Where there was a requirement for the formation of the new company, the board of Imperial Innovations also became involved particularly in relation to the management of the College's intellectual property. It should also be noted that not all companies being formed within the College would require investment from the Seed Fund.

### **Collaboration and the involvement of external organisations**

4.17 Collaboration was not chosen as an approach for the UCF proposal because the College felt that they had a sufficiently large potential deal flow within the College itself and lots of opportunities and also because they felt that there were sufficient complexities and difficulties in establishing an operational and successful fund involving one partner without the complexities of the requirements of other institutions.

4.18 Despite not collaborating directly, the Imperial seed fund shared its processes and documentation including its 'Investment Pack' with other funds established under the UCF scheme.

4.19 For the UCF 2 round, there was a requirement for collaboration and the Imperial fund did not apply for an expansion for the reasons given above.

4.20 The main external involvement in the Knowledge Transfer Programmes has been through:

- the involvement of NIKKO Principal Investment through a co-investment fund in particular, but there have also been efforts to develop relationships with a number of major Venture Capital funds, business angels and other seed funding sources
- the involvement of external members of the Advisory Board including major VCs such as Merlin Ventures and 3i, major companies and entrepreneurs from industry such as BP, BAe and David Potter of Psion (Chairman).

4.21 The role of the RDA (London Development Agency) has not been particularly significant.

### **Impacts, outcomes and benefits of the Seed Fund**

4.22 During the early stages of the Seed Fund, investments were mainly made in the form of convertible loans. Subsequently, more equity investment has been made particularly where co-investment has occurred.

4.23 During the course of the development of the Fund, a strong relationship has been developed with Nikko Principal Investments who have brought in investment funds (setting aside £10m and a possible further £10m) for co-investment in projects. However, this money can no longer be unlocked because it requires an initial investment from the UCF Fund which has now become fully committed.

4.24 Subsequently, the Seed Fund is developing relationships with a wide range of venture capital funds for follow on and co-investment purposes.

4.25 The deal flow was found to be constrained by a number of factors:

- The funding made available by the DTI was less than half the original request and this had several consequences:
  - there was no need to promote the fund within the College because the level of deal flow was ample without promotion. Had the full funding request been granted (£8m), there would have been no difficulty in finding investment opportunities
  - the selection of propositions for investment was made stricter as a result of this lack of funding and only the top prospects received funding
  - there was insufficient funding to allow ‘follow-on’ funding at a later stage in a company’s development often resulting either in the company developing more slowly, or in dilution of the Fund’s ownership of the company when other investors were brought in
  - the lack of follow on funding also made it more difficult to find external people to take a lead in investing mainly because of the large amount of work involved in preparing a case for co-investment
- the limit required by the DTI of £250,000 per company also constrained deal flow because it constrained the possibilities for the Fund to provide follow-on funding. This had a particular impact in the biotechnology, health and life sciences field where development times are generally long.

4.26 The Seed Fund has led to the following outcomes and outputs:

- catalysing thinking about the formation of new companies within the College
- establishing a pipeline of companies with seed funding
- taking the College firmly into the realm of innovation and entrepreneurialism
- developing companies on to a stage where Venture capital firms would be interested in them
- establishing an infrastructure of committees, procedures, criteria etc for undertaking seed investment and a track record of experience in doing so.

- 4.27 One of the key objectives was that the fund should become self-sustaining (and generate an endowment). This is unlikely to be achieved because:
- the fund is now fully committed or spent
  - the value of the fund (using BVCA methodologies) is less than the original value.
- 4.28 In relation to the UCF objective of stimulating others to become involved in investing in the nation's science and engineering base, the Imperial fund has been a success particularly in relation to the involvement of Nikko and corporate finance groups.
- 4.29 In relation to the broader objectives of the UCF, the Seed Fund has been an enormous success in:
- catalysing new companies to come forward from within Imperial College
  - speeding up the development of an entrepreneurial culture
  - encouraging academic staff to think about the innovative potential of new ideas and not only about the technology
  - there has been an enormous increase in the rate of new company formation since the two schemes were developed, partly due to the funding provided by the Seed Fund and partly due to the build up of the infrastructure for entrepreneurship.
- 4.30 There is a view that the constraints caused by the rules and the level of funding has led to a lost opportunity. There would have been considerable advantages in establishing bigger funds. In particular, some members of the Advisory Board are of the view that the DTI should have topped up existing funds rather than establishing a new competition with different rules. There was a suggestion that the idea of government funds providing 'cornerstone' finance to allow private funding to come in at reduced risk should be considered.

### **Key issues and lessons learned**

- 4.31 When the fund was first being developed, a great deal of time and effort was expended in debating how it should be run. Initially, the management structure involved a 13 person Investment Committee (subsequently delegated to three and then two sub-committees). In retrospect, the initial approach was over complicated.
- 4.32 A second point is that, in retrospect, the Fund has sought to invest in a very wide range of activities from proof of concept to companies that were a lot further down the track. It would probably have been better to focus only on full seed opportunities although this would have left a gap at proof of concept.

4.33 At the current stage, with all of the funding committed, the prospects for realising value from the fund through exiting from companies are not good in the short term. The main argument explaining why this is the case is as follows:

- the fund was too small to make it possible to achieve success. There is a minimum quantum that needs to be achieved (around £8m in the venture capital sector) to enable a fund to invest in portfolio of companies to achieve success
- there was no opportunity to invest in follow-on funding that would allow the fund to capitalise on companies that were likely to become winners and that this led to the Fund's equity stake in these firms being diluted
- the lack of size and the rules about maximum investment led to a lack of flexibility that inhibited the ability of the fund to become self sustaining
- the cost of management of seed companies is very high.

4.34 A number of constraints were caused by the criteria and rules of the UCF programme. These included the £250,000 limit on investment referred to earlier and the requirement that the seed fund should be the first investor, which limited opportunities for investment in some start up companies.

### **Additionality**

4.35 The funding gap for early stage seed funding was seen to be a major obstacle in getting new businesses up and running. This gap was caused by lack of funding for first investment from established venture capital funds for a number of key reasons:

- many of the potential enterprises were very early stage, involved considerable risk and required considerable assistance
- many were too small and too early stage to be of interest to venture capital funds
- the amount of work required to develop these early stage proposals made them unattractive to VC funds that could find more straight forward propositions, or that were larger or that did not require such a high level of work
- there is a gap in the UK caused by a lack of angel finance (compared with the USA).

4.36 There is a regional venture capital fund called the London Capital Fund. However, this is not able to do what the Imperial fund does. This is because it is unusual for start –up technology based companies to be immediately revenue generating and this constrains investment from the LCF. The LCF criteria more appropriately match companies that are not based on technology.

- 4.37 There is, consequently, a genuine gap in the innovation cycle at the early stage before VCs become interested. No external organisation or fund would have been likely to have invested in the Imperial seed fund directly. As a result, the activities of the seed fund within Imperial have been highly additional. The programmes have not displaced other activities in the University
- 4.38 Overall, it is thought that the UK is generally under investing in R&D causing a strong focus on incremental technology, but with a lack of investment in new disruptive technologies which are overlooked. The UCF and SEC programmes are seen as being necessary to help some of these disruptive ideas to the next stage of development.

### **Conclusions**

- 4.39 Imperial College has actively managed a new seed capital fund using its own resources and expertise with some outside advice. This has led to considerable co-funding and follow-on funding. The large number of opportunities for investment from the College research base has led to the fund being fully committed. Overall, the fund has:
- enhanced awareness of enterprise among college staff and students and facilitated a considerable culture change
  - facilitated the formation of new companies that would otherwise have struggled to find seed investment
  - led to the commercialisation of important new technologies and provided a spring – board for the future
  - utilised all its funding and provided a possible future source of additional longer term funds for the College.

## **5 London Metropolitan University**

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### **Background**

- 5.1 London Metropolitan University was formed as a result of the merger of the London Guildhall University and University of North London in August 2002. The University is now the second biggest in the UK in terms of student numbers with a very high proportion of ethnic minority, mature students and first generation students. The university has a major role in teaching and a research base that is largely applied.

### **Reasons for applying to the HEIF**

- 5.2 The University had been undertaking outreach activities under HEROBC particularly in relation to the employability of students through the development of accredited work placement (i.e. placements that counted towards a degree). The University has traditionally had a strongly community based approach and the introduction of HEIF provided opportunities to develop this further particularly relationships with business.

### **Applications within the KT Programmes**

- 5.3 The two universities put in two separate bids to HEIF, both of which were successful. Following the merger of the two universities, these HEIF projects were run as a single scheme. The university did not apply for other areas of the KTP such as SEC or UFC because it perceived that the funds were mainly aimed at research intensive universities.
- 5.4 The overall aims in applying for HEIF were to:
- build on the activities already undertaken through HEROBC
  - increase the participation of students in accredited work placements including more accredited professional placements, more sandwich year placements in science and engineering and developing better contacts with employers
  - develop the scope and activities of the Business Sector Managers
  - pump prime access to the enterprise centre
  - broaden the university's income base in the area of knowledge transfer through CPD, applied research and consultancy

## How were the funds and initiatives managed

5.5 The two universities obtained two equal HEIF 1 awards as indicated below. These were run as one programme after merger

|                   | HEIF Solo |
|-------------------|-----------|
| Participation     | *         |
| City applied for  | 500,000   |
| City obtained     | 500,000   |
| North applied for | 577,000   |
| North obtained    | 577,000   |

5.6 However, there has been a difference in the disposition of funding between the North and City campuses

- City focussing the majority of its expenditure on sector managers ( capacity building “animateurs”) and developing branding and promotion of services to business.
- North spending about one third of the funds on supporting sector managers, one third on expanding work experience and one third on income generation and access to enterprise

5.7 Part of the University’s mission is to contribute to economic development and research undertaken after HEROBC showed there was a need for more of the enterprise activity to be focussed on SMEs.

### Activities

5.8 One of the main uses of the HEIF funding has been to develop the infrastructure within the University necessary to support knowledge transfer.

5.9 The significant activities funded under HEIF 1 included:

- recruiting 10 sector managers whose job is to provide an active interface with sector business and increase the range and volume of collaborative activities with industry /business
- developing the incubator facility which now has some 10 tenants and space for 6 students developing plans e.g. desk space and support,
- developing the food centre and polymer centre

- developing “Furniture Works” as a sector hub, providing training, technical support, networking and show room space for designers and manufacturer, 345 companies supported, prototypes made for 27 designers, numerous exhibitions and events
- developing plans and raising funding for a state of the art digital manufacturing centre for furniture and the wider creative production industries
- training academic staff in dealing with businesses
- implementing a CRM system to track and manage all contacts across the university with customers/ business
- developing marketing and promotion strategies for services to business

### **Management structures**

5.10 The university has set up structures to bring about a significant culture change. Initially the North and City campuses set up separate organisations:

- Innovation and enterprise unit in North
- Regional and commercial partnerships unit in City

5.11 These have been combined into a department of Business Development Services. This has a number of functional areas:

- Innovation and enterprise unit
- Employability unit
- Development funding unit
- Metro New Media Training unit
- Digital media innovation centre (incubator and business support facility)
- Short course and summer school unit

5.12 The approach to the management of resources was originally different in the North and City campuses with:

- The North being managed from the central department
- City being devolved to departments

5.13 This arrangement is now coming to an end and, under the more recent HEIF2 funding, budgets will be devolved to project managers in academic departments.

- 5.14 The 10 Business sector managers are located within specific university academic departments and report both to the Head of Innovation and Enterprise within Business Development Services and also to the head of the relevant academic Department. The Business sector managers have targets for revenue e.g. for the development of CPD courses, applied research or testing. At the moment, the activity is not self funding, but the aim is for the sector managers to become self supporting
- 5.15 All staff in Business Development Services is employed by the University and report in to the university's Director of Business Development, who in turn reports to the Deputy VC ( Research and Development) and through him to the Executive Group of the University and the Board of Governors.
- 5.16 The knowledge transfer function also reports to the University's R&D Committee via a sub group, the Business and Community Links Group which is chaired by the Director of Business Development. This brings together representatives of the main units involved in Third Stream activities across the university (Innovation and Enterprise unit, Employability Unit, London Office, Research Institutes, commercial units, sector managers etc). This group develops and oversees the implementation of knowledge transfer policies and other elements of the university's Third Stream Strategy.
- 5.17 There is no overall committee or steering group of external members looking at the whole of the policy for KTP, but there are advisory boards for particular sectors that include external members. In some cases, these advisory boards have taken advantage of pre-existing sectoral groupings e.g. BusinessLink groups. These advisory groups include:
- the Advisory Board for the Incubator (which is in the same building as Metro new media) which was set up with HEIF funding..
  - Food technology network – using a BusinessLink network
  - Furniture - a BusinessLink network
  - Polymers – developing a network
  - Financial services – has a Think Tank which includes external members
  - Silversmithing and jewellery – about to set up a network

## **Collaboration arrangements with other universities**

- 5.18 The two initial bids were submitted separately by each university and won separately. However, since the two universities were merging it was an obvious step to seek to collaborate after the two bids had been won. There has been no significant collaboration with other universities in relation to HEIF 1 funding. However the university is a member of 2 of the 3 Knowledge Exchanges in London funded under HEIF2

## **Collaboration with other bodies**

- 5.19 The London Development Agency has issued an economic development plan and this has formed the basis for the sectors chosen under HEIF 1 for the sector managers. There was also support from the City Fringe partnership for bids to the LDA. Direct support for the KTP activities has also included:

- LDA funding for the refurbishment of two rooms in the Furniture Works premises.
- support from the Goldsmiths Company for the Goldsmiths Centre within the University.
- ERDF funding to support activities in the Objective 2 parts of the area
- funding from the Sir John Cass Foundation for work in employability

- 5.20 There have also been a number of collaborative activities with local / community bodies such as Mazorca, Renaisi (Hackney), Ideas Stores, Tower Hamlets Borough, City Fringe partnership and BusinessLink for London, but very little delivery of any of these activities through others

## **Impacts, outcomes and benefits**

- 5.21 The HEIF 1 programme has provided funding to allow the development of KT policies and processes and other infrastructure including developing a more pro-active profile and branding for enterprise with students and a higher profile for the university with businesses
- 5.22 Business networks have been developed particularly in areas such as furniture, food and new media. A major activity has been student placements to enhance the employability of students. These included bursaries for students to undertake placements and also employability courses.
- 5.23 To a large extent the infrastructure is now in place. A consultancy policy has been developed. An IPR policy for the university is almost in place and an IP specialist has been employed who undertakes audits of academic areas and works on product patents. This activity is starting to be linked to research projects as these go forward.

5.24 The Sector managers are operating successfully in the main academic areas. Their job is to go out and develop opportunities and develop involvement of local industry and SMEs. However, some departments do not yet have sector managers and, in other departments the processes have not yet become fully embedded.

5.25 The University's organisational arrangements for enterprise have so far worked extremely well although it is recognised that there is still a need for further work, e.g. to update the HR policies relating to incentives relation to consultancy policies as well as to undertake further work on costing and pricing in relation to enterprise activities. However, the basic structure for enterprise is now thought to be in place delivering:

- much better access for business particularly for manufacturing with specific points of access
- more employers approaching the university
- evidence of much improved readiness of graduates for employment
- partial success in the transfer of ideas with the sector managers going out to develop knowledge transfer activities in relation to applied areas. However the university is not research based and consequently does not develop leading edge research outputs.
- enhanced relationships with business through the various advisory boards
- the development of strategic objectives related to knowledge transfer e.g. on income generation
- developing objectives for the University in relation to its role in regional development
- a contribution to economic development in its immediate catchment area particularly within some of the three most disadvantaged boroughs in the country
- a significant improvement in relation to the culture of enterprise within the university,

5.26 The university has made progress in relation to consultancy, intellectual property , promotion of its services to business and CRM systems but recognises there is still a long way to go , particularly in relation to structures and processes that have been set up to deal with very large numbers of students for example:

- HR
- Finance
- Marketing

5.27 These needs have been reflected in plans and proposals for the future including a successful solo bid and two successful collaborative bids under HEIF 2 leading to £2.8m more funding. This funding will be used for :

- developing a consultancy unit in architecture
- developing enterprise in the curriculum
- working on the branding of the enterprise agenda both with students and positioning the university with businesses
- implementing the ‘Customer First’ scheme among staff in the university’s departments. This is a quality scheme operated by BusinessLink. This is part of getting departments to become more outward facing
- extending HEIF activities to other sectors such as Environment, applied social science, urban regeneration, health
- helping to develop actions which have formed the basis for a CETL(HEFCE) bid which has reached the final stage
- extending and deepening the university’s contribution to the regeneration of the Thames Gateway through taking the lead within the Knowledge Exchange on knowledge transfer to manufacturing and production industries.
- contributing to the economic development of London more generally through partnering the Knowledge Exchange for the Creative industries

### **Problems and key issues**

5.28 The bidding process under HEIF 1 took a great deal of time and resources. There were also problems caused by uncertainty since uncertainty about funding makes it difficult to recruit and retain good staff. Another temporary constraint has been that the KTP activity has been going on during the middle of a merger which has required considerable staff time and resources for reorganisational issues rather than for developing enterprise and knowledge transfer.

5.29 Specific failures in the KT area have included some of the activities in opto–electronics where there had been an overly ambitious proposal from a sector manager which proved to be unsustainable.

### **Additionality and displacement**

- 5.30 At the time of the HEIF 1 bid, funding bodies such as the LDA did not exist. The possibilities for obtaining ERDF funding were limited by their requirements for obtaining match funding requiring the university to find another source.
- 5.31 It is thought that, without the HEIF 1 funding, the University would have only undertaken work in a limited way, with only some of the employability work being undertaken and little activity or benefits in terms of infrastructure ( i.e. no incubator, no CRM, no SME outreach). As a consequence, additionality was high and displacement was low

### **Key lessons learned**

- 5.32 The KT programme funding has demonstrated the importance of building up third stream activities and the need to locate this strongly in activities and people within the relevant academic departments.
- 5.33 It has also demonstrated the importance of the development of employability programmes within a very large university whose primary role is teaching and where a large proportion of the student body are from diverse backgrounds including mature students, ethnic minorities and first generation students.
- 5.34 The London Metropolitan case illustrates the importance of KT programmes for universities that do not necessarily have a major research activity, but where entrepreneurship, better linkages with industry and a pro-active approach to linking specific departments with industry and commerce provide a valuable usage of third stream funding.

### **Conclusions**

- 5.35 London Metropolitan University has sought to develop its third stream activities during a period of major organisational change during the merger of its two constituent universities. The use of HEIF funding to establish better linkages with industry, to enhance the employability of students and to build an enterprise culture within individual departments demonstrates the relevance of the KTP funds not only to research intensive universities, but also to teaching oriented universities with very large student numbers

## **6 Manchester Technology Fund, University of Manchester**

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### **Background**

- 6.1 The new University of Manchester has been created by bringing together The Victoria University of Manchester and UMIST, two of Britain's most distinguished universities, to create a powerful new force in British Higher Education. The new merged University was established in 2004 with an unprecedented £300m investment programme. The new institution with a wide range of high quality teaching and research and a broad spread of academic subjects, we will be able to compete with the best universities in the world. The new institution is expected to be the largest single-site university in the UK, offering students a greater choice of degree programmes and options, and even better facilities and student support services
- 6.2 The Manchester Technology Fund is a £6m Fund established by the Victoria University of Manchester (lead) and UMIST prior to the merger to provide funding to enable the early translation of science and technology discoveries towards products and applications with commercial value. OST and the Wellcome Trust awarded £4.5m and a further £1.5m contribution was made by the two universities (£1,125k University of Manchester, £375k UMIST).

### **Reasons for applying to the Knowledge Transfer Programmes**

- 6.3 Manchester University and UMIST had a long tradition of collaboration in knowledge transfer programmes so it made sense to produce a combined bid to increase bid flow and efficient management of resources.

### **Applications within the Knowledge Transfer programmes**

- 6.4 In addition to the MTF Programme Manchester University and UMIST have collaborated on HEIF1 and SEC bids.

### **How were the funds and initiatives managed?**

- 6.5 The legal structure of the fund involves a jointly owned (University of Manchester and UMIST) fund management company (The Manchester Technology Fund Ltd) with the funds and assets held by the University of Manchester. The fund management company advises and manages. It is dedicated and university owned in proportion to the size of their investments.

There is a Board of six non-executive directors, four of whom have no contacts with the universities. The Board take decisions on which projects should be invested in.

- 6.6 The fund management company employs two externally recruited investment managers (1.1FTE) and has clear authority to make investment decisions. Richard Young, the Managing Director, is also a member of the Board. The fund managers have their offices on campus – MTF has combined venture capital disciplines (i.e. independence from the universities) with being on campus to allow face-to-face discussions with the people they are helping to work their projects up.
- 6.7 There are no paper based applications; Richard Young meets with all of the applicants to discuss their projects. MTF will either accept or reject an application for funding. If rejected MTF will advise the applicants what further work might need to be done and some projects which have previously been rejected come back later and will then be funded. Richard Young also ensures academics are fully aware of what is involved in commercialising their project e.g. what is involved in being a CEO or CTO of a company. If the academic does not wish to take on these roles then Richard Young finds a suitable candidate through his contacts and use of head hunters etc. All of these activities are funded through UCF.
- 6.8 MTF is monitored through close involvement of the Board's non-executive chairman. There are quarterly board meetings at which a systematic review of investment performance is carried out. There is a 6-monthly report to the shareholders (the universities) and an annual audit. Added value is monitored through regular reviews with university tech transfer heads and an independent review by PREST is underway.
- 6.9 Successful bids may also often be helped by a 3<sup>rd</sup> party investor such as grants, private individuals or business angel. Seven out of the thirteen investments have generated 3<sup>rd</sup> party investment – of these 5 have received post-MTF initial funding.

## The Collaboration arrangements with other universities

- 6.10 The knowledge transfer programmes led by the Victoria University of Manchester are listed in Table 6.1 below.

| Table 6.1: Manchester University Knowledge Transfer Programmes |                    |  |                                   |                                      |
|--|--------------------|--|-----------------------------------|--------------------------------------|
|  | KTP programme area |  |                                   |                                      |
|  | HEIF solo          | HEIF collaborative                           | UCF                               | SEC                                  |
| Participation  | *                  | *  | *                                 | *                                    |
| Name   | *                  | GIN  | Manchester Technology Fund        | Manchester Science Enterprise Centre |
| Nature of participation  | Solo               | Collaborative (Manchester, UMIST, Liverpool) | Collaborative (Manchester, UMIST) | Collaborative (Manchester, UMIST)    |
| Amount applied for   | £700,000           | £2m  | £4.5m                             | £800,000                             |
| Amount awarded   | £700,000           | £2m  | £4.5m                             | £800,000                             |

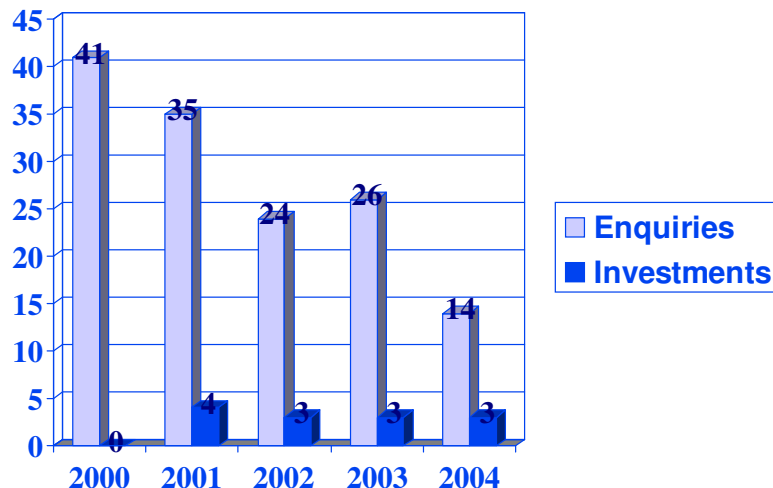
## Collaboration arrangements with other bodies

- 6.11 There are no explicit arrangements between the MTF and other bodies. However, the MD is used to work in the venture capital sector and is still well networked within it which can prove extremely useful when trying to obtain additional outside funding.

## Impacts, outcomes and benefits

- 6.12 There are no explicit priorities in terms of disciplines or types of business. There have been 127 enquires in 4.5 years of which 13 have been funded (see overleaf).

Figure 6.1: MTF number of enquiries and investments

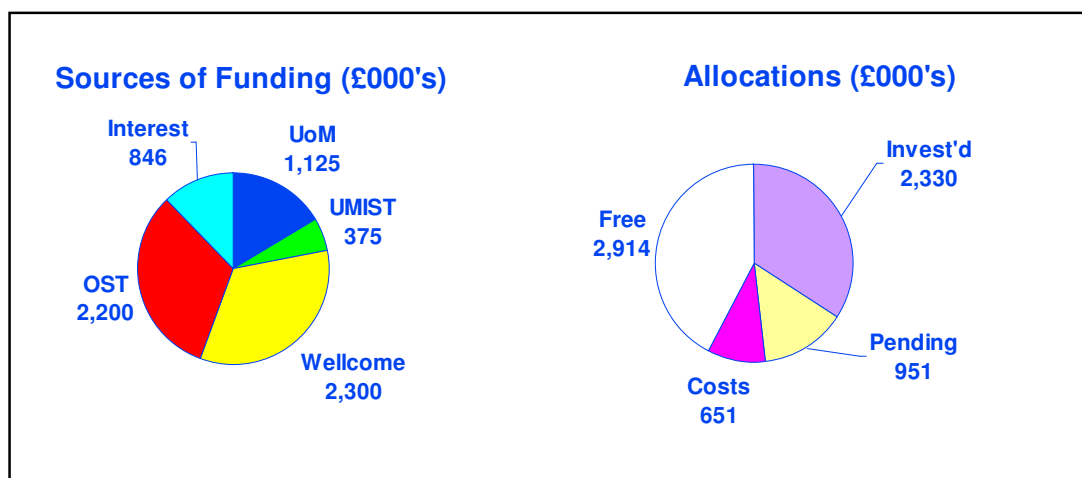


6.13 Over this period, 2000-2004, enquires have been as follows:

| Table 6.2: MTF number of enquiries |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|
|                                    | 2000 | 2001 | 2002 | 2003 | 2004 |
| Life Sciences                      | 70%  | 20%  | 17%  | 33%  | 29%  |
| Other                              | 30%  | 80%  | 83%  | 67%  | 71%  |

6.14 Sources of funding and allocations are as outlined below. Fees are kept to the minimum in order to have the maximum for investing in projects.

Figure 6.2: MTF sources of funding and allocations



6.15 On the basis of current rate of investments each year, Richard Young forecasts that there is money until 2009. Based on rate of return on the investments, the fund is forecast to be sustainable.

6.16 There is still a need for capital funding – sustainability is still achievable but the customer adoption and investment cycles are longer and the fund is vulnerable to a small number of events e.g. there will be a problem if only the later investments generate revenue.

6.17 The Managing Director felt that the long term effect of MTF is driving quality up – MTF do not invest in every enquiry and will tell some to go away and rethink.

6.18 The MD's personal targets were to have 50% of investments going on to further investment and to make five investments each year. In fact due to a slightly weaker deal flow than anticipated and in order to meet the 50% further investment target, he has revised the number of investments from five to three a year. Other outputs include:

- seven out of thirteen investees have generated 3<sup>rd</sup> party investment

- six out of 13 investees are generating significant revenue
- two investees were part of a recent English Tech Tour
- three investments with upward revaluations totalling £0.8m, based on 3<sup>rd</sup> party investment.

6.19 In addition, as a result of MTF activity and the projects invested in there has been added value for recruitment:

- eight mentors have been hired plus ~10 for non-MTF projects (e.g. MIL, UVL projects)
- four CEOs have been hired
- both informal and formal networks (five agencies) have been used
- nine institutional investors in MTF companies plus two angels.
- academics have also been given experience in business planning.

### **Problems and key issues**

6.20 No significant problems have been encountered to date though take up of the scheme was slower than anticipated at the start of the programme.

### **Additionality**

6.21 Without UCF, some university funds might have gone partly to ad hoc investment but there would not have been a dedicated fund such as the MTF. The fund has resulted in high additionality in two respects:

- *Fund capita*: MTF reaches back further than private funds would be perhaps prepared to do. MTF investment draws in other investors through working projects up to a stage where private funds would be prepared to invest
- *Infrastructure/expertise*: MTF goes far beyond what the private sector could justify. MTF is also bridging a culture and communications gap through being on campus rather than being based at a location away from the campus and therefore not providing such easy access for academics.

### **Key lessons learned**

6.22 The UCF bidding process was felt to have several advantages:

- greater rigour

- wider consultation
- creation of pressure that resulted in
  - creative thinking
  - a combined bid – if OST had not hinted that they should, UMIST and the University of Manchester would probably have not bid together
  - operational independence i.e. UMIST/University of Manchester through setting up MTF put money aside into a ring fenced pot for these activities which they probably would not have done otherwise.

6.23 MTF have ambition to raise a 2<sup>nd</sup> fund from the private sector in 2006-7. There is, however, a tension between the university focus and interests of the private sector who would probably want to look outside of the university to the wider North West. In the long term the MD saw MTF becoming redundant; he would regard this as a success. MTF would probably then become a private VC company with any equity gap being filled by smaller investors such as angels.

6.24 MTF collaborates with a number of other initiatives within the universities involved, for example seminars and project reviews for MSEC and MBS Incubator. MTF interaction complements the wider profile-raising of KT activity amongst academics. MTF is not involved directly in these activities although it does participate in network meetings and has collaborated in marketing and PR. MIL/UVL have done the broadcasting – MTF is not necessarily known university wide but MIL/UVL will trawl the universities for ideas and then pass people onto MTF.

6.25 The MD strongly discourages activity as a measure of success – the only conclusive measure is asset realisations.

### **Conclusions**

6.26 The basic infrastructure is now in place, the system is working well and there is the money for another person to be employed. The MTF model has worked particularly well so far and there seems no obvious reason why it should not work equally well in other universities providing that there is sufficient deal flow within the institution(s) to support this size of fund.

## 7 University of Teesside

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### **Background**

- 7.1 The University has a strong history of bidding for European Structural Funds including ERDF and ESF in order to develop business-facing activities and it is geared towards generating hard economic outputs. HEROBC funding was of enormous benefit as Teesside was able to put some money towards revenue support for EU-supported infrastructure – an example being the Centre for Enterprise team, who have continued to be supported through HEIF1.

### **Reasons for applying to the Knowledge Transfer Programmes**

- 7.2 The University saw HEIF1 as a major opportunity to help embed the best elements of current enterprise activity and further develop its support infrastructure for third-stream work. HEIF offered a degree of flexibility and continuity that was not available through European project-based funding, that could help in providing and building capacity. In addition to developing general enterprise capacity, the University sought to enhance a specialist area of expertise that had been developed through the ERDF-funded Virtual Reality Centre, in partnership with Newcastle University's Regional Centre for Innovation and Design. In both cases, a collaborative approach was taken, on the basis of strengthening working links, exploiting complementary expertise, and achieving critical mass in knowledge transfer delivery. The large institutional bid, Knowledge North East, involved all the region's universities; while the VR-based project, Real Time Interaction Centre, was a partnership with Newcastle. The HE sector in the North East has a good track record in collaboration; and additionally had been given a strong collaborative steer by both HEFCE and the RDA.
- 7.3 The programme was deliberately structured to align with the RDA's Strategy for Success, but because of delays with its implementation, there were no structures in place with which the sector could effectively interact, with the result that planned financial leverage from Strategy for Success was not realised. This, coupled with the fact that Knowledge North East was awarded only half the grant requested, made it more difficult to deliver on all of the collaborative aspects of the business plan. Only Knowledge House, the regional HE consultancy programme, had the strategic infrastructure already in place for collaborative activity; other planned collaborations – in graduate enterprise for example – required a higher resource input than was available, although established principles of sharing information and best practice about graduate enterprise and other third stream activities have proved beneficial to overall delivery. The lower level of funding meant that the universities did not have the planned capacity for full collaboration with each other. However, partners worked through

the existing Unis4NE structure to try and ensure that programme delivery was overseen and co-ordinated at a regional level. The Unis4NE structure and the engagement of all partners has ensured that virtually all performance indicators have been delivered in full, and in a significant number of cases exceeded.

### **Applications within the Knowledge Transfer Programmes**

7.4 The University was involved in two HEIF 1 collaborative bids:

- *Knowledge North East*: £143,000 for Knowledge House and £286,000 for other HEIF activities
- *Real time Interaction Centre*: £675k including £125k capital. The funding was split two-thirds to Teesside and one-third to Newcastle University.

7.5 It has also received small amounts of funding from the North East Centre for Scientific Enterprise (SEC funding) for three projects.

### **Activities undertaken with the funds**

#### ***HEIF***

7.6 The activities under HEIF 1 have included:

- **Centre for Enterprise Team:** providing business enquiry and signposting services, hosting events, training programmes and seminars, and offering a managed facility for business-related activities
- **Enterprise Development Fund:** a small-scale fund offering staff and students the opportunity to develop ideas with commercial potential to a stage where they can be supported with external funding (such as the Proof of Concept Fund) or expertise
- **Bridges & Routes:** a short-term initiative placing graduates with Sees
- **Knowledge House (KH) Manager:** the KH central unit is based in Sunderland with a KH manager based at each of the five universities in the North East. KH offers a single access point to companies needing help (consultancy or training) and also manages the actual contracts. KH works across a range of sectors: for Teesside the work has mainly involved IT, manufacturing, animation & games, and website and database development. Prior to HEIF Knowledge House was fully dependent upon ERDF funding, which meant that the coverage of the service was confined to SMEs in the region. However, with HEIF funding it has been possible to expand the work with businesses

- HEIF 1 has paid for the salary of the Teesside KH manager, as at other HEIs, until August 2004 (this is now supported through HEIF2). The programme has been supplemented with an ERDF-funded 50% consultancy subsidy for participants, which has played an instrumental role in engaging SMEs in an area of market failure
- funding has also been used to market to companies, identify academics for consultancy, raise academic awareness, visit firms, undertake project management and monitoring, support financial management and protect the university's IP
- the HEIF 1 funding has led to increased turnover and contract size and a higher number of enquiries and repeat businesses. Teesside has held a series of events getting experts in front of companies and developed case studies, which have been published in the local press
- **Graduate enterprise support:** on which the University has established a very strong track record, could not be sustained through HEIF1 because of the reduced level of grant awarded. While project-based European funding helped to plug the gap, it necessarily limited the range of activities that could be undertaken; and the Universities' original plans to develop a co-ordinated graduate enterprise programme could not be achieved.
- **The Real Time Interaction Centre (RTiC):** built upon skills and expertise in virtual reality business applications, originally supported through ERDF. Its purpose was to develop commercial applications on the back of R&D, in collaboration with the Regional Centre for Innovation in Engineering Design (RCID) at the University of Newcastle, combining computing, graphics and engineering specialises. The funding has:
  - funded 3 development posts
  - helped to develop a range of products, software and applications, in partnership with industry. A number of software applications have generated interest and will be sold as licences; others are either being further developed in-house, through the Digital Knowledge Exchange (see below) or are the subject of Proof of Concept funds.
  - led to the formation of two companies.

7.7 HEIF2 funding awarded for the establishment of a Digital Knowledge Exchange has meant that the University has been able to retain the expertise developed under RTiC, and to progress the work on commercial applications. This activity is central to a major new initiative being led by the University, DigitalCity, in partnership with local and regional agencies, to stimulate and support the growth of a digital sector cluster in the Tees Valley.

## **SEC**

7.8 The University was involved in the North East Centre for Scientific Enterprise (NECSE) largely through its project awards programme, set up to finance relatively small-scale development projects in science enterprise. At Teesside the School of Science & Technology used grant funding for the following activities:

- support for the establishment of a Foundation Degree in Chemical Technology which enrolls 25 part-time students per year. It has been developed in conjunction with 8 local businesses and is now in its third year – it also has an industry based steering group
- incorporation of a stronger enterprise orientation to engineering programmes, involving business in project management modules
- professional seminar series in biology and bioscience aimed at final year students and later widened to include postgraduates. This was not run as part of a course, but the University has now integrated it into a number of core modules, assessed on the basis of a business plan. This model enables students to achieve credits.

## **Overlapping activities**

7.9 The HEIF 1 and SEC activities do not really overlap. However, there has been some limited interaction between Knowledge House and SEC to develop graduate training in science and technology subject areas on IP and licensing rather than consultancy.

## **Impacts, outcomes and benefits**

### **HEIF**

7.10 The project has contributed to the following HEIF 1 aims:

- Improved organisational arrangements and structures and enhanced ability to respond to business and community needs
- Better access for business and the community to HEIs, and more use of them
- More widespread systematic and rapid transfer to businesses of new ideas, products and processes generated within HEIs
- Improved readiness of graduates for employment
- Improved relationships between HEIs and businesses and community organisations at a personal level

- Enhanced capacity within institutions to respond in a concerted and effective manner to other initiatives promoting employability, enterprise and skills
- Enhanced contribution to the economic development of the nation, particularly in economically disadvantaged regions
- Systematic and sustainable change within HEIs in how they relate to business and the community, particularly changes in institutional and academic cultures.

### **SEC**

7.11 It is now more readily recognised that students need entrepreneurial skills, and that this aspect adds value to courses, although there are still problems in getting past the traditional academic “comfort zone”. However, the University now has new enterprise and curriculum strategies in place, and these, along with a range of new enterprise appointments made in Schools, will be an important driver for embedding enterprise in the curriculum.

7.12 SEC has delivered only small amounts of funding for the University, but these funds have added considerable value to activity. The seminar series, in particular, has been very useful for building relationships between staff and local businesses.

7.13 In terms of the aims of SEC the university has met the following:

- Stimulate scientific entrepreneurialism
- Incorporate the teaching of enterprise into the science and enterprise curricula
- The promotion of an entrepreneurial culture at all levels within the university.

7.14 The University is now providing funding for an enterprise awareness programme for all staff.

### **Additionality**

7.15 The key benefits of HEIF1 have been the extent to which funding has helped to promote the greater engagement of academics with business. Without HEIF 1, Teesside would have been unable to fund its Centre for Enterprise team; which has played a key role both in promoting the university to business, and in signposting to appropriate services. The strong focus on direct economic outputs of other funding regimes precludes this type of activity, essential though it is. HEIF has similarly helped to fund small-scale “risky” activity such as the development of commercial ideas (through the Enterprise Development Fund) and a short programme of 14 graduate placements that resulted in 10 jobs. Both of these activities were undertaken with HEIF support when no other funding sources were available. Without SEC it would not have been possible to run enterprise in the curriculum courses. Other available funding regimes, for which there is strong competition and some of which have been subject

to significant delays, tend to focus on highly specific outputs which do not in themselves address the issue of capacity-building or an enterprise skills infrastructure.

- 7.16 An alternative focus for the university might have been community-based Knowledge Transfer. However, the University's own enterprise strategy has a very clear commercial focus, in line with the expectations of Government and the region. In addition, social and community initiatives are more readily fundable from local, regional and national programmes; and a strong base of community activity is being developed through this route. (notably through Schools Liaison, the Social Futures Institute, the Community Informatics Research Unit, and student volunteering).
- 7.17 For Knowledge House, HEIF1 funding has broadened the range of consultancy provision that can be offered, and has provided some continuity of funding. Although the university has a clear focus upon regional economic regeneration, and works largely with companies in the North East, this level of freedom is very important in facilitating strategic partnerships to support its activity. Without HEIF 1 KH would have remained reliant upon ERDF, with the restrictions that this entails; and as ERDF is now being phased out would now be seeking funding from other non-specified sources, with the prospect of itself disappearing. There would also be greater confusion amongst SMEs in the region about the HE "offer".
- 7.18 For the *Real Time Interaction Centre* the funding was instrumental in supporting the development of applications with real commercial potential that would not have been possible under other funding regimes with a much shorter-term focus on business assistance. Its collaborative nature was very beneficial to both partners, and longer term the activity is continuing under the aegis of the Digital Knowledge Exchange.

## Conclusions

### *HEIF*

- 7.19 Overall, the basic infrastructure is now in place and the university has been able to consolidate and expand it with support from HEIF2. It has formulated a focused enterprise strategy, and has now recruited a significant number of professional staff with relevant knowledge transfer expertise to work in academic Schools and central departments. Levels of academic interest in terms of enterprise and commercialisation (in its broadest sense) have improved, and Teesside has more capacity to engage with staff. Some challenges remain, not the least of them the need to step up levels of consultancy. This is being addressed through an incentivisation policy, although the typical entrepreneurial staff member is more often than not already heavily engaged in teaching and/or research, and time constraints are often the biggest problem.

- 7.20 For **Knowledge House** the aim is to continue current activities, as well as growing activities inside and outside the region, and expand into the service and creative industry sectors. The long-term aim is for KH is to be self-sustaining, but in reality an SME subsidy is likely to remain necessary for some time, and this will require RDA support.
- 7.21 **RTiC** funding has enabled the University to build up its skills base, which it has largely embedded in Schools and central units such as the Digital Knowledge Exchange, and to take a more commercially-focused approach to the development of business applications. With the formation of two new companies now working in the digital sector, the project has made a contribution to the University's and the sub-region's strategy for the creation of a digital cluster on Teesside.
- 7.22 HEIF 1 has also helped to generate other sources of funding such as Knowledge Transfer Partnerships (KTPs), which have increased from an average of 1-2 per annum to 11-12 over the past 3 years. The university has put more resources into this activity and developed a regional KTP network for the north east. This has helped to enhance student and firm interest in enterprise/commercial activities. The RDA has now signed up as a sponsor of KTPs, and is additionally funding a pilot programme involving shorter-term graduate projects with industry for the universities.
- 7.23 Under HEIF2 Teesside has taken a highly strategic approach to knowledge transfer, and is focusing on addressing the enterprise culture through:
- continued involvement in Knowledge House
  - continuing funding for Business Support and Graduate Placement teams, strengthening of Consultancy and knowledge transfer teams
  - expansion of the Enterprise Development Fund and a fund for IP protection
  - business and project development staff in Schools and specialist centres
  - improved project management techniques for business-facing and r&d teams
  - encouraging graduate enterprise and developing a new business incubator, with a strong focus on digital technologies as part of the development and delivery of DigitalCity.

## **SEC**

- 7.24 NECSE's collaborative bid to HEIF 2 Collaborative was not funded. In the absence of a specific pot of funding to support enterprise in the curriculum, Teesside is developing strategies for incorporating it through the engagement of HEIF staff and the training of

academics. Enterprise and entrepreneurship appointments through HEIF in the Teesside Business School will play a key role in helping to deliver this.

## **8 White Rose Centre for Enterprise (WRCE), University of Leeds**

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### **Background**

- 8.1 The White Rose University Consortium (White Rose) is a strategic partnership between Yorkshire's leading research universities of Leeds, Sheffield and York. The combined research power of the three institutions ranks alongside that of the Universities of Oxford and Cambridge and accounts for 86% of the region's research spend. The White Rose Centre for Enterprise was funded from £2.9m Science Enterprise Centre funding.
- 8.2 Teaching provision from WRCE (SEC) funds is mainly provided on a competitive basis. Departments bid to the WRCE for funds to develop teaching materials and they must undertake to develop these in collaboration with their counterparts in the other two universities. If successful they are given 50% of the funding in advance. When they have delivered these materials in a usable format and this has been installed on the Centre's website based at Sheffield then they are given the other half. The aim is to embed entrepreneurial training in the curricula of 75% of students by the end of the project. Training is provided for potential intrapreneurs as well as entrepreneurs.

### **Reasons for applying to the Knowledge Transfer Programmes**

- 8.3 The WRCE promotes an enterprise culture to staff and students within the three universities. It delivers enterprise learning and training to increase the entrepreneurial skills and competency of graduates, postgraduates and research staff to accelerate the rate of technology transfer and new company formation. The WRCE also runs an annual business plan competition and an annual Enterprise in Action exhibition showcasing companies set up by both staff and students at the three universities. The universities had already established the White Rose Consortium and a joint proposal seemed a natural extension for the consortium's activities leading to more efficient use of resources and exchange of good practice between the three institutions.

## **Applications within the Knowledge Transfer programmes**

- 8.4 Apart from Leeds University's solo bid to HEIF1, all applications to knowledge transfer programmes have been through the White Rose consortium.

### **How were the funds and initiatives managed?**

- 8.5 SEC has provided funding for a range of new staff including the Director of the based in Sheffield and a post for a Director of Enterprise Learning at Leeds. Recruitment has been a big problem. There were only three applicants for the Sheffield post and only one was suitable.
- 8.6 In addition, each University has a Business Development Manager (BDM) which were all internal appointments, and an Enterprise Learning Manager (ELMs) whose main responsibility is to roll out the enterprise learning development projects. Two of the ELMs were external appointments and one internal.
- 8.7 The issue of how to change culture in academic staff is one which is common to all UK universities. The approach adopted at Leeds was to try and achieve this cultural change indirectly by concentrating on the learning materials rather than the staff directly. Examples were given of staff who felt they had no experience relevant to enterprise learning but discussions with SEC staff made them realise that in fact they or their colleagues already had a wealth of relevant material. This type of facilitation was an important aspect of the approach.
- 8.8 The bidding process was also a useful in that it both encouraged staff to participate to gain additional resources and also made them focus on the issues before submitting their application.
- 8.9 The approach taken for enterprise learning which has led to it being embedded in mainstream courses, means that this element should be self sustaining. It will in effect be easier to update these elements of the courses rather than replacing them with something different.

## The Collaboration arrangements with other universities

8.10 A summary of Leeds University knowledge transfer activities is given in Table 8.1 below.

| Table 8.1: Leeds University Knowledge Transfer Programmes |                    |                    |  |  |
|---|--------------------|--------------------|--|--|
|   | KTP programme area |                    |  |  |
|   | HEIF solo          | HEIF collaborative | UCF                                    | SEC                                    |
| Participation   | *                  | *                  | *                                      | *                                      |
| Name  | *                  | *                  | White Rose Seed Corn Fund              | White Rose Centre for Enterprise       |
| Nature of participation                                   | Solo               | *                  | Collaborative (Leeds, Sheffield, York) | Collaborative (Leeds, Sheffield, York) |
| Amount applied for  | £524,000           | *                  | £4.5m                                  | £2.9m                                  |
| Amount awarded  | £524,000           | *                  | £4.5m                                  | £2.9m                                  |

### Impacts, outcomes and benefits

- 8.11 The infrastructure was rapidly put in place in 2001 and the system is working well. The management of the programme are keen to complete the current phase of embedding entrepreneurial training throughout the university and then see the emphasis switching more towards continuous professional development for staff and external users (particularly SMEs).
- 8.12 It will also be important to try to achieve similar awareness raising and culture change in non-science and engineering departments (these were excluded from SEC funding). HEIF2 should contribute towards this goal; some departments such as Health and Psychology are already part way down the road.
- 8.13 Much of the funding has been used to embed enterprise learning in the science and engineering curriculum by buying out staff time to develop training materials, and commissioning of professional advice from outside the university.
- 8.14 Leeds University – in common with many other institutions – uses a resource centre model to cost its teaching activities. There has in the past been a backlash against service teaching caused by this for two reasons:
- centralised teaching, Maths for example, means that under the resource model science and engineering departments who utilise the service lose resource from their budgets
  - there is also the feeling that the Maths taught this way is not sufficiently embedded into the main subject.
- 8.15 The consortium therefore decided that “bolt-on” courses were not the best way of providing enterprise teaching because:

- there would be resistance against further use of service teaching
  - the modules would not be sufficiently integrated into the main subject area.
- 8.16 It was interesting to note differences in approach between different departments even within related disciplines e.g. biology were not at all keen (initially), environment however were very effective and developed an integrated tiered approach which provided training for graduates, undergraduates and staff.
- 8.17 Cultural change has definitely been achieved. Though the main emphasis has been the preparation of teaching materials for students, this has had significant effects on the staff involved. Many did not realise that their courses and departmental experience contained valuable teaching resources which could be turned into case studies and examples of good (or bad) practice for entrepreneurial training.
- 8.18 The decision was made not to spend significant amounts on research but one output has been the realisation that research itself can be viewed as an entrepreneurial activity with the original idea needing to be marketed and if successful managed effectively to get the best return to the practitioners.
- 8.19 The initiative was evaluated by the Higher Education Policy Unit (HEPU) in 2000/20016. The analysis was based on 902 completed questionnaires (467 first and 435 final year students) and covered the disciplines of biology, earth sciences, psychology, engineering, geography and business across the three participating universities. The study addressed four themed areas:
- ***Involvement in enterprise activity before entering university;*** 30% of students who responded had been involved in enterprise activity before entering university, usually connected with some sixth form activity
  - ***Involvement in/awareness of enterprise activity at university;*** 74% of first year students indicated that they would wish or intended to become involved in an enterprise activity at university. In the case of final year students this number dropped to 36%
  - ***Innovators and entrepreneurs;*** 86% of respondents indicated that they “maybe interested” or would be “very interested” in being involved in a module looking at the role of innovators and entrepreneurs in business

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<sup>6</sup> Enterprise Learning: an analysis of questionnaires distributed to students of the three White Rose universities during the 1999-2000 session, HEPU, January 2001, 14p

- **Definitions of an enterprising student;** the students were asked to define an “enterprising student” and around one third felt that an enterprising student was “skilful”, “innovative” or “one who showed initiative”.

8.20 The survey displayed that experience of enterprise amongst those surveyed was often well advanced but also showed potential for further development.

8.21 There is also an ongoing audit of new entrepreneurial courses which so far has over 40 departments registered. They are now in the process of identifying gaps in provision and addressing these.

### **Problems and key issues**

8.22 The main problem has been the recruitment and retention of suitably qualified staff. Retention of staff is also made more difficult by the fact that they have to be retained on short term contracts (two left mid-term to take up full time appointments elsewhere).

### **Additionality**

8.23 In the absence of the SEC funding very little activity would have taken place in terms of increasing enterprise learning in most departments with a few exceptions. The fact that additional real funding was available to encourage these developments was a major factor in the programme’s success.

### **Key lessons learned**

8.24 Part of the role of the ELMs is to evaluate all initiatives and develop examples of good practice. It would be useful for them to exchange their ideas and experiences with others performing a similar role at other universities.

8.25 Wherever possible crucial posts such as the ELMs should be offered as full time posts rather than short term contracts as competition for the best people is very strong.

### **Conclusions**

8.26 Future activity in this area at Leeds should be approached differently to build on the cultural changes already achieved i.e. the universities are not starting from the same position. The cultural changes achieved so far have been a major success of the programme.

8.27 There seems no reason why the approach adopted by Leeds should not be adapted by other universities embarking on a significant programme of encouraging enterprise learning, in particular those attempting this for the first time. Such strategy should work equally well in the humanities and social sciences.

## 9 Central Science Laboratory

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### Background

- 9.1 CSL is one of five Executive Agencies of the UK Government Department Defra (Department for Environment, Food and Rural Affairs). There are two regulatory agencies, the Pesticides Safety Directorate and the Veterinary Medicines Directorate, and three laboratories, CSL, CEFAS (Centre for Environment, Fisheries and Aquaculture Science) and the VLA (Veterinary Laboratories Agency).
- 9.2 CSL specialises in the sciences underpinning agriculture for sustainable crop production, environmental management and conservation and in food safety and quality. It has a turnover of £43m and 700 staff with around 550 fee-earning chemists, biologists and other specialists – CSL is in essence an internal service provider to Defra with 70% of its work in the form of contracts for this Government Department. CSL was moved to the state of the art 50 acre site just outside York purpose built in 1997 at a cost of £130m. This provides a strong operational base but the capital and related annual costs of circa £9m pa means that the Laboratory has no margins and finds it very difficult to run a breakeven budget or a truly commercial operation.

### Reasons for applying to the Knowledge Transfer Programmes

- 9.3 The current commercial director was brought in from the private sector around six years ago and realised that there was no commercial structure in place. He started by carrying out a strategic analysis of CSL strengths and established 12 strands of business at the Laboratory. These are now being reviewed and refreshed to help refocus the fee-earning work. Since 1997 commercial income has grown from around £1m to circa £10m per annum at CSL, mainly from analytical and other scientific service based work and some other specialist Development work from a widening customer base. In general, CSL carries out three types of science:
- policy support – for Government departments
  - scientific service work such as monitoring and testing – for public and private sector customers requiring impartiality independence and very high standards
  - R&D – very focused applied sciences to answer specific needs (25% of the work).

- 9.4 CSL trades on the specialist knowledge of its staff, but prior to the PSRE fund the specific exploitation of its patented Intellectual Property (IP) had been on the back burner due to a lack of capacity to fund development. The Baker report has been key to CSL because it recognised that Agencies were different from the Universities who were spinning out IP and businesses ‘left and right’. Until very recently, CSL has been forbidden to bid for Research Council Funding or related Knowledge Transfer funding, but will now be able to partner with Universities for collaboration purposes.

### **Applications within the Knowledge Transfer Programmes**

- 9.5 Central Science Laboratory as the lead organisation along with the Veterinary Laboratories Agency and the Centre for Environment, Fisheries and Aquaculture Science received £231,860 from the Public Sector Research Establishment Fund for a capacity building pump priming project called TransAct spanning 2.5 years

### **Activities undertaken with the funds**

- 9.6 The aim was to: identify IP and understand it; shape it by creating awareness amongst staff; protect it; engage the market by finding and building networks between scientists and exploiters. In terms of target of markets there have been no ‘no go’ areas – however some have been more commercially active than others such as plant health and food. The PSRE funding has been used by CSL for it to employ a suitably experienced exploitation manager (with a scientific background), undertake a wide range of development activities, establish the basic internal exploitation systems and network into relevant external best practice organisations including PRAXIS, AURIL, UNICO, and ASTP. The IP Exploitation Manager has also enrolled on a year long course for patent administrators – the qualification for this will mean that CSL is not solely dependent on external organisations for IP advice. CSL has also used an IP training company for the training of scientific staff which has led to greater staff awareness of IP issues and more enquiries by the staff about IP exploitation. The PSRE funding has paid for some of the fees for specialist patent agent advice and the registering of trademarks etc – this means that CSL is now better able to police and protect its various brands as it expands its profile in the niche markets

### **Collaboration arrangements with other agencies**

- 9.7 CSL were keen to bid for PSRE once the original announcement was made and decided to put something together with its sister agencies CEFAS and VLA. A bid was prepared for all three agencies but as CEFAS and VLA were not in a position to manage and support it themselves CSL took on the lead role. There was a greater urgency and drive for CSL to find commercial income due to the imperatives of its funding position and this meant that little more could be done in the longer term IP exploitation area without PSRE funding.

- 9.8 The primary focus on CSL was planned and part of the proposal – the agreement with the VLA is on a call-out basis. CSL staff carry out all of the IP arrangements for CSL and the IP Exploitation Manager provides selected support for VLA when requested. CEFAS employs around 550 people focusing on fisheries research and has a strong relationship with Government as it is virtually the sole supplier. CEFAS employs a technology transfer manager who is responsible for all IP arrangements. VLA employs around 1,400 staff focussing on animal health – in terms of IP exploitation it has developed a strong income of £0.5m pa from its provision of specialist veterinary materials and maintains a small defensive patent portfolio in line with the requirements of its customers.

### **Additionality**

- 9.9 None of the activities were in place previously – CSL has five business development managers (around 100 people per unit) but they are too busy delivering the demanding income development targets and do not have the specialist skills to further exploit the IP process. CSL could have continued to maintain a small patent portfolio but it would not have been able to proactively negotiate deals on the patents or explore for spin-out and other collaborative opportunities. There would also have been a much lower level of staff awareness with regard to IP issues and commercialisation and CSL would not have introduced the IP reward and incentivisation scheme. There would have been little stimulation of IP interest amongst the scientists at CSL. The running of the whole operation would not have happened without the funding to pay for the IP Exploitation Manager – therefore a high level of additionality.
- 9.10 Both CEFAS and VLA have been junior partners in the project but have gained as much out of their relatively low level of involvement as possible. At CEFAS the funding has funded the Technology Transfer Manager’s attendance on the patent administrators course mentioned earlier, and has helped in supporting the development and promotion of in-house proprietary technology – CEFAS now has a spinout company, CEFAS Technology Ltd, which assists with commercialisation of CEFAS IP. The equivalent CSL and CEFAS contracts staff communicate well regarding best practice. CSL has worked much more closely with VLA in terms of IP awareness training and increased links between the two sets of scientists – several joint developments are being explored and the VLA has been very complimentary about the activities and about the value of having access to expertise during the induction of their new commercial manager.

## **Conclusions**

- 9.11 As stated in the original proposal the aim was for the IP Exploitation Manager's post to become self-funding if CSL were in a position to generate sufficient income from its licences. However, the scale at CSL is not yet big enough for this. The Laboratory now has the capacity for IP related activities; it knows where to look internally and externally but CSL in isolation does not have a big group of promising patentable technologies/IP to really make a difference in the exploitation area. The Commercial Director stated that the current "machine" is now working well but there are real concerns that CSL may well have to "turn it off just as it starts to purr" due to the PSRE funding coming to a close. The commercial operation at CSL is already run at full stretch to serve the ever-growing annual income-earning needs of the organisation, and there is simply insufficient capacity to set aside significant resource to seek the longer term opportunities afforded through IP exploitation.
- 9.12 There are some important basic processes now in place such as the identification and protection of IP, the proper use of Confidentiality and MTAs, and the due diligence development of IP opportunities. Also, the new Intellectual Assets Panel which deals with the IP reward and incentivisation at CSL is well established and the first payments to staff have been made. The mechanics of running this can be undertaken using alternative staff but the expertise would be lost if the IP Exploitation Manager does not stay at CSL, and much of the other systems could only be maintained with external contracted advice of specialists such as patent agents, lawyers etc . The Commercial Director and his colleagues are continually seeking access to other sources of relevant funding and in the interim he has put together a business plan for the continuation of the role within CSL but in reality he has had to curtail other important marketing/development activities to allocate resource to retain the IP Exploitation Manager beyond the end of the project. This will inevitably have an impact on the value that can be extracted from the CSL intellectual property base, and on activities such as staff training and awareness and the best practice networking with external organisations professionals and consultants.
- 9.13 The last six months of the IP Exploitation Manager's time in relation to this round of PSRE funding will be focused on analysing and prioritising the know-how and other IP at CSL, continuing the dialogue and collaborative explorations with the other Agencies. There will also be input to deliver the CSL commitments to a PSRE Round 2 project that CSL is involved in along with DSTL, HPA and VLA.
- 9.14 After rationalisation and recent applications, CSL now has around 15 patent families and various other forms of registered IP, data and know-how – some of this is licensed out although the licences are at an early stage with as yet minimal financial returns. This includes:

- Agreements and licences to DSTL for a microbiological detection technology - they have set up a rapid diagnostics spin-out that has won first round external investment funding of £4m
- Development of a specialist diagnostics manufacturing/distribution operation selling into the plant protection industry and which now aims to seek external investment for expansion into other niche markets - the PSRE funding has been extremely helpful for carrying out some of the due diligence and IP negotiations.
- several other IP licensing negotiations and explorations are on-going.

## 10 National Museums Liverpool

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### Background

- 10.1 National Museums Liverpool is England's only national collection based outside London. The museum's unique venues are home to fabulously varied collections covering everything from social history to space travel, entomology to ethnology, dinosaurs to docks, arts to archaeology.
- 10.2 The Department of Sculpture and Inorganic Conservation was formed by the museum in 1991 to develop and utilise technology for the cleaning and preservation of sculpture, ceramics and metals. The department was awarded £287.5k under PSRE1, which led to the formation on the Conservation Technologies initiative.
- 10.3 The funding has been used to help develop expertise in three-dimensional laser scanning of objects, archiving, and manipulating the results as digital images. This then allows the production of faithful copies of these artefacts, using highly accurate CNC (computer numerical control) machining and rapid prototyping technologies. This digital image can then either be used to create a replica directly e.g. from marble, or to produce a temporary copy which can then be used to make a mould allowing casting of a copy (or multiple copies) without direct contact with the original.
- 10.4 The department also has expertise in laser-based cleaning techniques. These are an extremely controllable method for removing unsightly and potentially damaging layers from the surface of an artwork (or other artefact). Such techniques are highly selective, non-contact and clean. In many cases, they give the conservator a level of control not possible using alternative cleaning methods. Conservation Technologies is able to draw on the experience of staff who have been involved in the development of laser cleaning systems in conservation since the early 1990s. The department's conservators have many years experience of using lasers to remove a wide range of unwanted surface layers from valuable artefacts.
- 10.5 The technologies have a range of target markets but these can be summarised as follows:
- Other museums, local authorities, parish councils and private collectors;
    - cataloguing their collections via 3D scanning
    - replication to safeguard the original
    - replication for sale

- conservation of artefacts
- reproduction of parts of artefacts to allow for complete restoration
- owners of historic buildings;
  - scanning and or cleaning of the fascias
  - repair/ reproduction of internal features
- Educational purposes;
  - training of other conservators
  - assisting museums and galleries with interactive displays
  - production of teaching aids for universities, colleges and schools.

### **Reasons for applying to the Knowledge Transfer Programmes**

10.6 The proposal for the first tranche of PSRE funding listed the following as the main objectives of the funding

- to conduct further research into laser cleaning, 3D recording and replication of artworks
- to continue development, testing and refinement of large-scale laser cleaning systems for cleaning public monuments, sculpture and historic building facades
- to continue the development of small-scale, precise laser cleaning systems for conservation using a microscope arrangement
- to achieve the refinement of 3D recording accuracy and improvement of manufacturing quality by upgrade of equipment.

10.7 The department is the leader in this area in the UK though there are other groups developing the technology, in particular in Germany, Italy and France.

### **Applications within the Knowledge Transfer programmes**

10.8 Only half of the original bid for £575k was awarded but the department has recently won another tranche of funding from Round 2 (£750k).

### **How were the funds and initiatives managed?**

10.9 The project funded the post of a Business Manager, but though he was very efficient his lack of knowledge of the sector and the technologies (his background was in the financial service sector) meant that he could act as little more than a middle man and the post only lasted for two years. The programme and contracts are currently managed internally by Centre staff.

## **Collaboration arrangements with other bodies**

- 10.10 The department has collaborated closely throughout with Lynton Lasers, a spinout from Manchester University who manufacture the laser equipment utilised for cleaning. Originally, the department also had a link with the Product Innovation Centre of Liverpool University but they have now been wound up. CNC manufacture is normally out sourced to another local company the Hothouse in Stoke on Trent.
- 10.11 Lynton supplies the laser cleaning equipment and benefits from enhanced publicity due to the teaching and other activities of the department. The relationship with Lynton predates the project and development of the technologies has been a joint effort. Lynton pays royalties to the department for each laser system sold. Hothouse have the CNC equipment and benefit from business (it would not be worth the department investing in its own CNC plant given the volume of turnover).
- 10.12 Conservation Technologies have received widespread publicity for their activities and this has contributed to other collaborations such as that with Loughborough University described later.

## **Impacts, outcomes and benefits**

- 10.13 Marketing and promotion for the conservators and educational markets has been largely by word of mouth. The department is world leader in the use of laser technologies and so is well known in the relevant circles.
- 10.14 The museum has been very supportive in terms of flexibility in working practices and use of facilities and consumables.
- 10.15 The timing of the first round of funding was ideal because it coincided with the need to replace a crucial member of the development team. Additionality has been high. There are currently 14 members of staff in the department and only five of these are funded by DCMS funds, the rest are funded through KT funds and the revenue the business and training activities generate. In the absence of KT, funding development of the business side would have been slowed dramatically. Without KT funding, the core staff would have been kept busy on the routine work of preserving the extensive collections of the Liverpool museums.
- 10.16 The basic infrastructure to develop the business operations is now in place and the development of the laser scanning and laser cleaning activities will continue. The department now has sufficient capacity to further develop the existing techniques, and is now generating over £200k year in revenue that makes the KT part of the group effectively self funding. The group also can get assistance from the museum and Partnerships UK for specific areas e.g. advice on IPR issues.

- 10.17 Further developments in the laser technology field will be geared towards refining systems to cope with both large and small-scale projects (facades of buildings down to archaeological finds).
- 10.18 The potential for haptic technology is also being actively explored. Educational applications could be particularly important in this area e.g. public awareness, schools and tertiary educational establishments.
- 10.19 They are also keen to secure additional funding to develop new technologies. One of these is a joint project with Loughborough University, which involves “growing” calcium carbonate crystals to repair damaged marble statues. The technique involves depositing “nanocrystals” within the pore structure of the statue to consolidate the degraded marble. Another possible application of this technology would be to use marble waste (a big problem for major producers such as Italy) to form new marble slabs or artefacts.
- 10.20 It is estimated that around £1.5 million is required to develop this technology. The KT funding has helped the department to secure additional funds from outside sources e.g., Leverhulme and Partnerships UK. Additional funding will be required to develop the marble growing technology to the point where it can realise its economic potential and the NWDA has expressed some interest in providing assistance.
- 10.21 The business plan is evolved through consultation within the group but is to a large extent demand led.

### **Problems and key issues**

- 10.22 Future projects would be advised to employ senior marketing staff with experience of the particular technologies being developed.

### **Additionality**

- 10.23 Additionality has been extremely high; little of the activity described above would have taken place without PSRE funding.

### **Key lessons learned**

- 10.24 The funding has been instrumental in increasing the development and marketing of these interesting technologies.
- 10.25 If business continues to grow, it is likely that the Museum will need to set up a trading company to protect its charitable status.

## **Conclusions**

- 10.26 There would appear to be scope for increased activity of this type amongst departments concerned with conservation technologies. The project is useful in demonstrating that third stream activities need not be limited to “traditional” areas of science, technology and engineering. The success of this project illustrates that such funding can benefit a wide range of disciplines.