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**The shaping of knowledge transfer from UK universities: an  
exploration of influences and motivations**

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## The shaping of knowledge transfer from UK universities: an exploration of influences and motivations

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**Abstract:** Industrial innovation can lead to economic benefits for a nation. Sources of such innovation are therefore important to governments. Over the last decade in the UK there has been a growth in government funding of knowledge transfer (KT) activities from UK universities, as they have been considered a relatively untapped source of innovation. European and regional funding tends to target work relating with SMEs (small to medium sized enterprises) within specific geographical areas. UK national government funding however, can encompass support for a very wide variety of university knowledge and technology transfer activities. This study examines why UK universities undertake knowledge transfer activities and how this work is shaped at individual institutions. Evolutionary theory is used to examine differences at a range of universities, using contextual information about each university's history and influences.

**Keywords:** knowledge transfer; technology; UK; evolutionary theory; university; footprint; European; funding

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## **1 Introduction**

Universities in the UK have been encouraged to participate in knowledge transfer (KT) activities through various, often consecutive funding initiatives since the late 1990s. However if the pattern of KT engagement of individual universities is examined, it is evident that the types and levels of activity vary greatly between different UK universities. Government reports relating to university KT activities look for overall trends and classifications of university types which are unrelated, and possibly irrelevant, to university knowledge transfer behaviour. To develop a better understanding of the reasons for UK universities to engage in KT, and the forms this activity takes, it is useful to look at individual institutions, their pattern of activity and the influences that have caused them to develop in this way. This study utilizes KT strategy documents and quantitative data to develop a novel approach to a KT “footprint” providing a snapshot of individual university’s knowledge transfer activity patterns. Further, through the use of evolutionary theory, information relating to individual university’s history and likely influences is offered in explanation of the patterns observed.

## **2 Literature Review**

There has been a great deal published pertaining to university technology transfer in the USA. A recent review of quantitative and qualitative research on the effectiveness of technology transfer concludes that “Because the work is still relatively nascent, much of it has been descriptive and approached from the perspective of inventorying the phenomenon.” (Phan and Siegel, 2006; 44) They also note that “...the literature remains somewhat embryonic with many unresolved managerial and policy issues.” (Phan and Siegel, 2006; 4)

Many papers focus on descriptive methodologies and/or analysis of survey results; usually utilizing regression analysis of the Association of University Technology Managers (AUTM) survey or of authors’ surveys (Thursby et al, 2001; Thursby and Thursby, 2002; Mowery, 2005; Feldman et al., 2002; Cardozo, 2001). An exception is papers authored by Siegel which often involve economic modelling using stochastic frontier analysis (Siegel et al., 2003; Link and Siegel, 2005). Another example of the use of theory based approaches is Bercovitz et al. in an examination of relationships between organizational structure and technology transfer performance. Also O’Shea et al. uses a resource based approach to explain differing success in generating technology based spin-out companies at USA universities (Bercovitz et al., 2001; O’Shea et al., 2005). This work is, in the main, at the level of the individual organisation, not looking at wider factors. It is also based on the American experience.

The UK related literature is somewhat less developed. Extensive literature searches have found some relevant UK literature which tends to focus on entrepreneurship amongst UK academics, for example Franklin et al. examine the role of surrogate (or external) entrepreneurs in university spin-out companies (Franklin et al., 2001). Lockett and Wright explore “...the extent to which the capabilities of technology transfer offices are important influences on the generation of university spin-outs within the context of universities’

resources and environments.” (Lockett and Wright, 2005) Also in the UK the terms knowledge transfer, knowledge exchange and knowledge sharing are used in addition to technology transfer to denote a much wider range of activities involving universities, industry and the wider community.

Phan and Siegel suggest that “the use of institutional theory and evolutionary economics perspectives to explain the persistence of differences in effectiveness across regions may be a fruitful direction in which to take the research related to regional development and university technology transfer.” (Phan and Siegel, 2006; 44).

A search of the literature has shown no evidence of the use of an evolutionary theory approach to UK knowledge transfer from universities. No previous work has been found which relates the history of industry links and government intervention in UK universities to current day knowledge transfer activities. Neither have the likely influences on individual UK universities, which have produced a wide spectrum of different KT engagement, been elucidated. In this study evolutionary theory is used as a framework for analysis of UK university KT activities and direction at individual universities.

#### *Evolutionary theory and the development of university knowledge transfer*

Evolutionary theory in economics analyzes the rationale for and outcomes of the actions of firms. In this study the tenets of evolutionary theory are used to explore UK universities and the features which have affected university knowledge transfer activities. Evolutionary theory is of interest in this research because it allows for a discussion not only of behavior of an organisation; but also how the organisation came to behave in that way, taking in historical aspects.

The key elements of evolutionary theory that will be utilized in this study are the development of routines in organisations; the concept of search, akin to mutation in Darwin’s evolution; and finally arising from these aspects the ideas of path dependence and path creation (Nelson and Winter, 1982; Nooteboom, 1997; Nelson, 2006). The development of routines can be useful to organisations. Hodgson states that ...“Routines in the firm have a relatively durable quality through time. They may help to retain skills and knowledge, and to some extent they have the capacity to replicate through imitation, personal mobility, takeovers, and so on.” (Hodgson, 1994, p. 416) However routines can also prevent organisations from changing. “Survival requires a balance of, on one hand, routine, habit, conservatism, continuity, and on the other hand, adaptability, innovation, shift.” (Nooteboom, 1997, pp. 63-64).

Hodgson discusses maximizing behaviors and the likelihood that the objectives of firms differ in this respect so that “...the selection process may lead to the congregation of units around a local, rather than the global, maximum. With a multiplicity of adaptive peaks the path followed and thus the peak obtained is path-dependent: a result of history.” (Hodgson, 1994, p. 422). Helfat examines “...the twin propositions from evolutionary theory of persistence and

differences in firms' activities." (Helfat, 1994, p. 1721). Helfat's study explores persistence which is related to ideas of path dependence. In universities these concepts can be applied to the continuation on a specific path which includes or excludes particular forms of KT activities. Also of interest is the idea that organisations differ in the types and levels of activities that they pursue and that they tend to persist in these differences over time.

In the case of universities, different actual behaviors with respect to KT will be discussed in later sections. However the view that individual organisation may pursue different paths due to their history and in search of different end results is important in this analysis. In examining the behavior of UK universities we are interested in routine behaviors and the origins of some of these routines. Also the departures from the routine by individual universities, both over the past few decades and in light of recent government initiatives are of interest.

### **3 Methodology**

The approach to this study is twofold and makes a novel contribution to methodology in this field. Initially qualitative data in the form of university strategy documents is examined to establish the range of different types of KT activities undertaken by UK universities. Then quantitative data collected in the UK annually in the Higher Education Business and Community Survey (HEBCI) is used to assess the levels of different KT activities undertaken at individual universities. Selected quantitative data over a wide range of activities is then categorized, using the classifications established from qualitative analysis of strategy documents, to allow for easier comparison of the direction of KT at different UK universities. This approach provides an insight into both the explanation provided by universities for their activities and the actual outcomes of university strategies.

#### *Qualitative Data*

A very useful source of qualitative data for English Universities has been the strategies published for the fourth round of Higher Education Innovation Fund (HEIF) allocations. HEIF is one of the main funding initiatives for English KT activities. In recent years there has also been a requirement for universities in receipt of HEIF funding to submit a KT strategy. These strategies, as well as the HEBCI survey data, provide an insight into the broad differences between universities.

In this analysis HEIF 4 strategies, prepared in the form of answers to a set of questions, have been used to determine the range of KT activities undertaken in English universities (HEFCE, 2008a). A spreadsheet of activities was compiled, based on analysis of 39 of the 133 HEIF strategies published, and the various types of KT activities discussed in the strategy documents were listed in the spreadsheet for each of the universities. Most of these activities were common to more than one university and they appeared to fall into three broad categories, as perceived by these researchers. These categories have been defined as

technology transfer, business support and regeneration (also referred to as economic development) and they are described in the paragraphs below. The single activities from HEIF 4 strategies were then classified according to where they fit into three main categories of knowledge transfer activities. Table 1 shows these items in the category assignments as well as the main funding bodies and some features of the activity types.

Business support might be viewed as closest to “normal” academic pursuits as this generally involves research funded wholly or partially by industry or teaching to industry participants. The normal routines of universities are research and teaching, so business support activities are an extension of these.

Technology transfer involves a move away from normal routines towards a more commercial outlook, either through the university’s own motivations or encouraged by funding streams. From an evolutionary theory perspective, UK universities that have been involved in technology transfer, prior to the advent of KT funding in the late 1990s, have unusual “routines”. This may be due to these universities retaining routines established in their early history or to a deliberate departure i.e. path creation.

Regeneration/economic development activities indicate the influence of European and regional development agency funding over the last decade. These activities are quite clearly a long way from the normal routines of UK universities (see Table 1). In the main, activities involve working with small companies in the local region, a major departure from expected routines of research and teaching.

### *Quantitative Data*

A cross comparison of the elements identified in the HEIF strategies and some of the data collected in the HEBCI surveys was used to develop individual university compilations providing a comparator between the stated strategies and the outputs. Data from the HEBCI survey for 2006-7, as well as information on Knowledge Transfer Partnerships (KTPs) was also organised into the three categories of technology transfer, business support and regeneration. Table 1 lists the types of data elucidated from HEIF 4 strategies which were considered for these three categories. The KT indicators in each category selected for the analysis in this study are shown in Table 2.

**Table 1 UK KT categories**

<i>Classification</i>	<i>Technology Transfer</i>	<i>Business Support</i>	<i>Regeneration/Economic Development</i>
Main Funding Bodies	HEFCE, some venture capital funds provided by UK government, Support from income earned	Industrial funding, some research council funds	European Union funding (e.g. ERDF), Regional Development Agency funding
Features of funding/ activity	Licensing and spin-out activity, some funds support start-up companies	Mainly funded by industry though some Research Council schemes to set up training or encourage collaborative research	Generally target support to SMEs, EU funding has strict targets to be met with respect to e.g. job safeguarding or creation and improvements in company turnover
Items elucidated from HEIF 4 strategy documents	<ul style="list-style-type: none"> <li>• Spin-outs/ Incubation</li> <li>• HEIF 4 budget for Spin-outs/ incubation</li> <li>• HEIF 4 budget for patents</li> <li>• Invention disclosures/ Opportunity identification</li> <li>• Patents</li> <li>• Licensing</li> <li>• Income from IP</li> <li>• Commercialisation mentioned</li> <li>• Proof of concept funds (as a % of total HEIF4)</li> <li>• Incentive policy for academics to engage</li> <li>• Academic staff as Enterprise Champions</li> <li>• Academic staff training in enterprise</li> <li>• Spin-ins</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic Relationships with Large Companies</li> <li>• Support for academic staff to engage in KT activities inc. buying out academic time (HEIF 4 Budget)</li> <li>• National /International focus</li> <li>• Collaborative/ Contract Research</li> <li>• Consultancy/ Commercial Services</li> <li>• Master and doctoral level programmes for industry</li> <li>• Non-credit bearing courses/skills development/CPD</li> <li>• CASE studentships</li> <li>• Academic staff training -KT</li> <li>• Secondments to/from Industry</li> <li>• KTP</li> <li>• Enterprise clubs/ Support to start-ups (from outside HEI)</li> <li>• UK KT Networks</li> <li>• Student placements</li> </ul>	<ul style="list-style-type: none"> <li>• Regeneration (income/ involvement)</li> <li>• SME income</li> <li>• Companies assisted (SMEs)</li> <li>• Sales increases</li> <li>• Jobs created/ safeguarded</li> <li>• Graduate retention/ employment/ employability employer engagement</li> <li>• Community/ social engagement / enterprise</li> <li>• Public sector</li> <li>• Regional Focus</li> <li>• Growth in KT income</li> <li>• Companies Created or attracted to region</li> <li>• Student/Graduate start-ups</li> <li>• Student enterprise</li> </ul>

Source: HEIF 4 Strategies from <http://www.ikt.org.uk/> accessed April 2009; The European Regional Development Fund – An Introductory Guide, Office of the Deputy Prime Minister, 2001

Somewhat less data was available for the regeneration category. In this case funding from the European Union (EU), Regional Development Agency (RDA) and UK Government regeneration funds have been used as proxy for KT activity. In addition the number of SME contracts in an RDA area for contract research, consultancy and commercial services has been utilized as most regeneration work is targeted at small companies within certain areas considered to be economically deprived. Finally student start-up companies have been counted in the regeneration category as they are generally both regionally based and encouraged within regeneration programmes. (HEFCE, 2008; Office of the Deputy Prime Minister, 2001). To provide a baseline for comparison, the figures for the individual universities have been taken as a percentage of the highest figures for a UK university.

The HEBCI survey is the most comprehensive source of KT data for UK universities but with more than 150 types of data it is problematic to compare the activities of individual universities. The approach described above seeks to simplify analysis through the use of a range of indicators classified according to their KT type; i.e. technology transfer, regeneration or business support. By using 6 indicators for each classification the risk of error through comparison of single indicators is reduced, but the cross comparison of multiple indicators is simplified. Further, by plotting the results on a radar (star) diagram, a picture of KT activity at individual universities can be produced.

For this paper 12 universities have been selected from a larger group analysed to illustrate the variety of university types and the range of KT activities they embrace. Table 3 lists the universities studied and provides a range of variables related to their size, type and other potentially relevant factors. Figures 1-12 show the results of this analysis and this is discussed in the following section.

**Table 2** Data types used for KT classifications

<i>Technology Transfer</i>	<i>Business Support</i>	<i>Regeneration/Economic Development</i>
<ul style="list-style-type: none"> <li>• Spin-outs with some HEI ownership</li> <li>• Spin-outs - Staff Start-ups</li> <li>• Invention Disclosures</li> <li>• Cumulative Patents</li> <li>• Number of Licenses Total</li> <li>• IP Revenues (£,000)</li> </ul>	<ul style="list-style-type: none"> <li>• Contract research (£,000)</li> <li>• Collaborative Research Income Total (£,000)</li> <li>• Consultancy (£,000)</li> <li>• Facilities and Equipment Services (£,000)</li> <li>• CPD Income total SME and Non-SME (£000s)</li> <li>• Knowledge Transfer Partnerships* completed in year (Sept. to August)</li> </ul>	<ul style="list-style-type: none"> <li>• ERDF Funding (£,000)</li> <li>• RDA Funding (£,000)</li> <li>• UK Government Regeneration Funding (£,000)</li> <li>• Other regeneration grants (£,000)</li> <li>• SME contracts in RDA area</li> <li>• Graduate Start-ups (no.)</li> </ul>

Sources: HEFCE (2008) Higher Education –Business and Community Interaction Survey 2006-07 July 2008/22; \* KTP database <http://www.ktponline.org.uk/action/search/complete.aspx> accessed February 2010



#### 4. Discussion

Individual university's KT activities are depicted in Figures 1-12 and different patterns of KT engagement can be discerned. It is clear, for instance, that University of Glasgow and Imperial College both engage in business support activities, although not the same activities. Maxima in any of the six indicators within the three categories of KT examined demonstrate a level of engagement in that category producing what we call a KT "footprint". For example, Figure 3 shows the KT footprint for University of Cambridge and the profile of engagement in technology transfer and business support is apparent. In contrast, Figure 4 for University of Central Lancashire (UCLAN) demonstrates engagement in regeneration activities and some activity in business support, but no noticeable activity in technology transfer. One might argue that a lower level activity would be expected from UCLAN given that the annual income is only 16% of that of University of Cambridge and anecdotally this appears to be the case for technology transfer activities. However size of the university does not appear to influence involvement in regeneration activities, as it is noticeable that, using these indicators, UCLAN engages in the regeneration activities whilst University of Cambridge does not. This may be due to the greater availability of ERDF funding in the North West of England (£1,076 million) when compared to the East of England (£94 million) (see Table 3).

Using Figures 1-12, universities have been classified according to their KT footprints. Table 4 is a grid showing the combinations of these activities. It is interesting to note that all of the universities here engage in some level of business support activities. This reinforces the view that business support activities are, as a natural extension of normal university routines of research and teaching (Decter et al, 2007), an area of KT that requires little adaptation. Nelson and Winter refer to organisations as "...being ... much better at changing in the direction of "more of the same" than they are at any other kind of change". (Nelson and Winter, 1982, p.9) Further research into a wider range of universities may confirm or reject this view.

There does not seem to be a relationship between the type of KT activity and the type of university (see Tables 3 and 4). However it is interesting to note that some universities, for example Colleges of Technology and Civic Universities were created to serve industry. For some universities, for example, Aston, those roots were lost due to the loss of local industry (Decter, 2009). For other institutions, such as University of Manchester, connections to industry have been continuous throughout their history (Interview – University of Manchester, 2010). There may exist a degree of path dependence in these industry connections which belies other, more, recent influences. Nooteboom states that "...Path dependence implies that what one can perceive, interpret and learn depends on the path of past development in ones environment." (Nooteboom, 1997, pp. 74-75). Although there may be influences over all universities, such as funding constraints or government policies, the response to such influences will be shaped by the organisational environment and its history.

**Table 3** Variables relating to Universities

<i>University</i>	<i>Total income (£ million) 2007-8<sup>1</sup></i>	<i>Year KT/TT office open<sup>2</sup></i>	<i>No. of PhDs<sup>3</sup></i>	<i>RAE ranking (2008)<sup>4</sup></i>	<i>University type<sup>1</sup></i>	<i>ERDF funding available in region<sup>5</sup> (£ million)</i>
Aston University	98	2000	50	52	Former CAT*	449
University of Brighton	146	1996	45	59	1992 - Former Polytechnic	23
University of Cambridge	1074	1970	995	2	Medieval University	94
University of Central Lancashire	169	1999	40	96	1992 - Former Polytechnic	1,076
University of Glasgow	397	1997	355	33	Ancient Scottish	292
Imperial College London	603	1987	695	6	Former College of Mines	170
Lancaster University	163	2000	215	20	New - 1960s	1,076
Loughborough University	177	1969	295	28	Former CAT*	217
University of Manchester**	684	2004	770	8	Older Civic	1,076
University of Salford	177	1999	85	61	Former CAT*	1,076
University of Surrey	200	1970	235	35	Former CAT*	23
University of Warwick	350	2000	295	9	New - 1960s	449

Sources: 1. Individual University websites for Annual Reports and background information 2. HEFCE (2008) Higher Education –Business and Community Interaction Survey 2006-07 July 2008/22 and HEFCE (2007) Higher Education –Business and Community Interaction Survey 2004-5 and 2005-6 July 2007/17 3. HESA statistics- Table R1 - Share of research output per share of research input, weighted by cost centre 2006/07 from <http://www.hesa.ac.uk/> accessed June 2009 4. THES interpretation [http://www.timeshighereducation.co.uk/Journals/THE/THE/18\\_December\\_2008/attachments/RAE\\_2008\\_THE\\_RESULTS.pdf](http://www.timeshighereducation.co.uk/Journals/THE/THE/18_December_2008/attachments/RAE_2008_THE_RESULTS.pdf) accessed Dec. 2008 5. ERDF (amount available 2000-2006 Objective 1 and 2) The European Regional Development Fund – An Introductory Guide, Office of the Deputy Prime Minister, 2001

\* College of Advanced Technology \*\* Victoria University of Manchester merged with UMIST 2004

Three universities participate in the full range of KT activities. These are Aston, Loughborough and Warwick Universities. All KT activity at Aston University is relatively low, but this is also by far the smallest university (by annual income) which may account for these levels especially for technology transfer activities. Alternatively this may be the result of a more recent reconnection with industry, as the KT Office at Aston opened in the year

2000. The Universities of Warwick and Loughborough lay claim to long connections with industry in their HEIF 4 Strategy documents. Despite this, although the KT office at Loughborough opened in 1969, the Warwick KT Office did not open, in its current form, until 2000, perhaps due to more informal links. (HEIF 4 Strategy Loughborough, 2008; HEIF 4 Strategy Warwick, 2008)

None of the universities engage in solely technology transfer or solely regeneration activities, but always in some combination with business support. None of these universities engage in a combination of technology transfer and regeneration activities unless they also engage in business support activities. This may be an artifact of the indicators and universities chosen or may indicate that the departure from routine, or path creation required to establish these activities in a university does not easily embrace both the regional economic development agenda and that of commercialization. This is possibly because path creation is a challenge in which "...entrepreneurs often encounter apathy and resistance." (Garud and Karnøe, 2001, p.15).

**Table 4** Grid of KT Activities

<i>Primary KT Activity</i>	<i>Secondary KT Activity</i>			
	<i>Technology transfer, Business Support and Regeneration</i>	<i>Technology transfer</i>	<i>Business Support</i>	<i>Regeneration</i>
<i>Technology transfer, Business Support and Regeneration</i>	Aston, Loughborough, Warwick			
<i>Technology transfer</i>		X	Cambridge, Imperial, Manchester	X
<i>Business Support</i>		Surrey, Glasgow	Brighton	X
<i>Regeneration</i>		X	Lancaster, UCLAN, Salford	X

Source: Diagram created from the interpretation of Figures 1-12

The three largest universities (by annual income) in this study, the Universities of Cambridge, Manchester and Imperial College all engage in technology transfer and to a slightly lesser extent in business support activities. These universities also have the largest numbers of PhD students. This may indicate more technical research and therefore a greater pool of technology from which to pull technologies to be transferred to industry or to form spin-out companies.

For two of these universities, Cambridge and Imperial College, the regional regeneration funding available is relatively low, so there was perhaps less opportunity to engage in regeneration activities. However the University of Manchester is located in the North West of England, a region in receipt of the largest level of ERDF Funding in this group and also home to the Universities of Central Lancashire (UCLAN), Lancaster, Salford; all classified as “regeneration” participants in this taxonomy.

The University of Manchester’s long history of industry connection may have influenced their path. In Helfat’s study of R&D in firms it is recognized that "... firms build on past areas of expertise.." (Helfat, 1994, p.1722). In this context the University of Manchester has remained close to its roots of business support and technology transfer activities.

The Universities of Central Lancashire (UCLAN), Lancaster, Salford are active in regeneration activities. Each mention their work with small to medium size enterprises (SMEs) in their HEIF 4 strategy documents which is a key requirement of ERDF funded work. For example:

“... we are increasingly developing our involvement with SMEs, not least through innovative activities supported by ERDF and other regional funding.” (HEIF 4 strategy UCLAN, 2008, p.2)

The focus on regional economic development is very clear in the Lancaster University strategy as demonstrated by the matching of their key performance indicators to the “RES priorities” (Regional Economic Strategy) (HEIF 4 Strategy Lancaster, 2008). These three universities have made an active decision to work in regeneration activities. In evolutionary theory terms, this type of activity is far from expected routines of a university. Certainly the availability of funding to support this activity in the region is a factor. However it is not likely that funding alone has brought about this change of direction as not all universities in this region, or in other regions well funded by ERDF and RDAs have adopted these activities. Interviews with KT officers support the view that a conscious decision was taken, influenced by individuals involved at the university at the time, to pursue this path. In Garud and Karnøe’s terms a “...process of mindful deviation lies at the heart of path creation.” (Garud and Karnøe, 2001,p.6) Interest from academic staff was also a very important element. (Interview University of Salford, 2007; Interview Lancaster University, 2009)

The Universities of Glasgow and Surrey are relatively strong in business support activities, but also undertake some technology transfer. The University of Surrey having lost government funding in first the Research Assessment Exercise (RAE), which directly influenced block research funding, turned to industry to replace lost funding and have now built to a position of receiving a large proportion of their funding, some 23%<sup>1</sup>, from other than government sources. The strategic decision to develop a large Science Park on land adjacent to and owned by the university has also influenced the direction of university KT (Interview -

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<sup>1</sup> This figure is derived from the sum of income for Contract research plus Consultancy plus Equipment and Facilities divided by University income for 2006-7

University of Surrey, 2008; HEFCE, 2008; University of Surrey website, 2008). This has an effect on the types of KT activities which are considered to be “business as usual” or routine, in this case business support activities, especially consultancy and facilities and equipment services. The path creation aspect, although influenced by the lack of future government funding, is evident here as "...path creation requires an ability on the part of entrepreneurs to shift their emphasis to alternative approaches that may have greater promise." (Garud and Karnøe, 2001, p. 7)

The University of Glasgow state in their Research Strategy, 2006-2010 that:

“Knowledge transfer (KT), in its broadest sense, is a key output of academic research, whether it is effected through the training of postgraduate research students who subsequently apply that knowledge in the public or private sector, through contract research, or the exploitation of intellectual property in established or start-up companies.” (University of Glasgow, 2006)

It is interesting both that KT is considered in the research strategy of the university, implying some embedding or “routinization of activity” (Nelson and Winter, 1982, p.99) and that the strategy places a greater emphasis on business support activities than technology transfer.

The University of Brighton appears to be engaged in business support activities. Specifically they are involved in Knowledge Transfer Partnerships (KTPs) and have completed 96 KTPs starting in 1988. There is a very small presence in SME contracts in the regeneration category which may not be significant, but is surprising given the very low level of ERDF funding received. A departure from the business support role would be unusual given low levels of financial support in the South East of England for regeneration activities, but is suggested in recent university strategy (HEIF 4 strategy University of Brighton, 2008)

## **5. Conclusions**

The KT footprint approach provides a useful tool to examine and compare KT activities at different institutions. Arguably different single KT indicators could be selected and this will be explored in further research. This study examines data from 2006-7 and further research will look at longitudinal data. However the principle of using a manageable range of indicators for each of three KT classifications provides a clear visual assessment of university’s KT activity preferences.

It seems likely that business support activities are considered to be a logical extension to normal university routines, and in some cases, part of routines that have continued from their origins as technical institutions serving industry. All of the universities in this small sample engaged in some level of business support to industry.

From this study it would appear that there may be a relationship between university size, or possibly the level of research activity (using PhD’s as a proxy) and technology transfer activity and a larger study may confirm or reject this idea. Certainly it appears to be possible

to relate KT activities with stated university strategy and to determine if the approaches to KT are the result of an extension of normal university routines or of deliberate path creation.

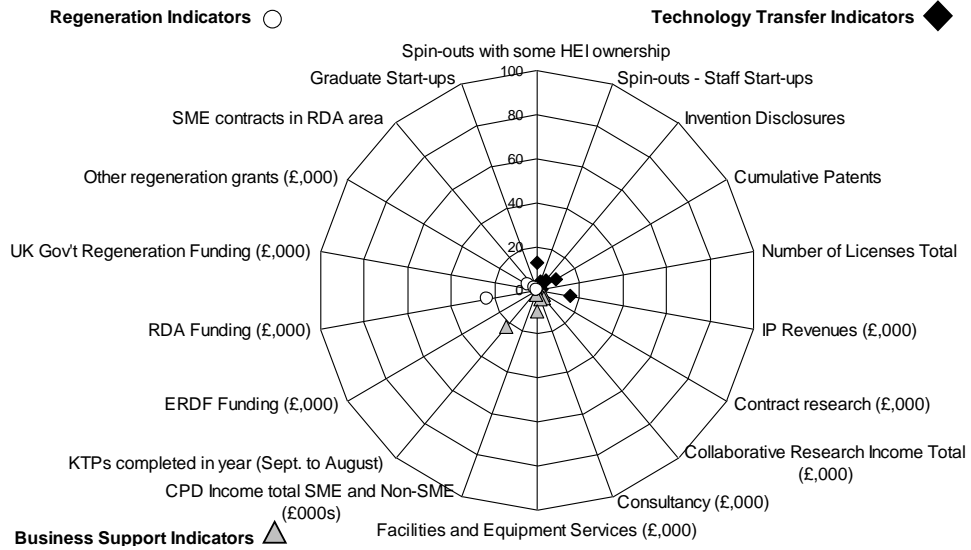
Availability of funding for a particular type of KT activity is not the only influence on the presence or absence of this activity at individual universities, although the level of that KT activity may be directly influenced by the means to carry it out (i.e. level of funding).

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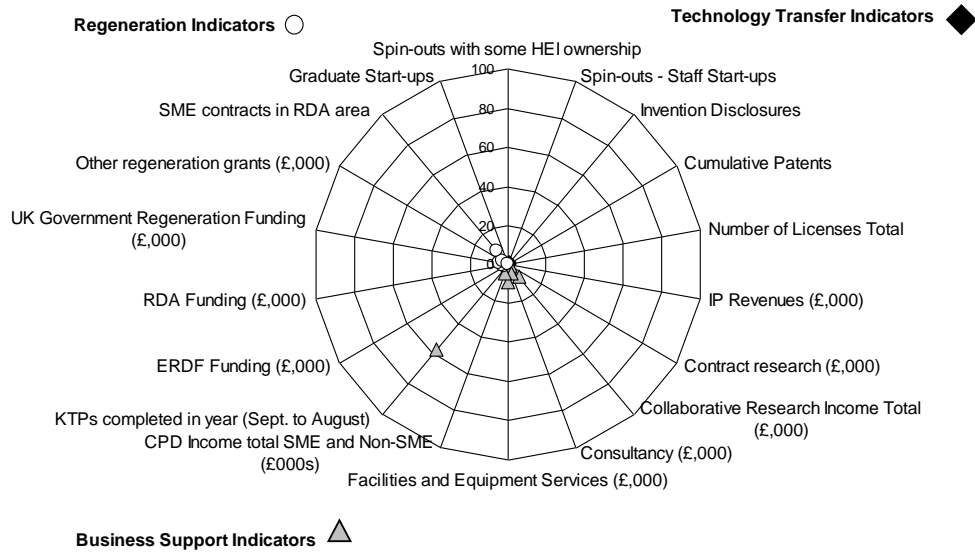
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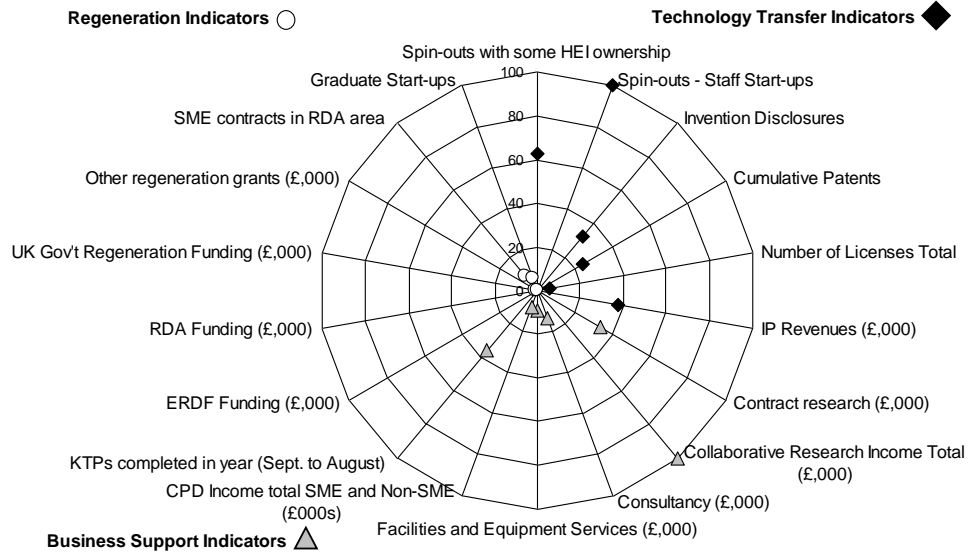
**Figure 1 Aston University KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



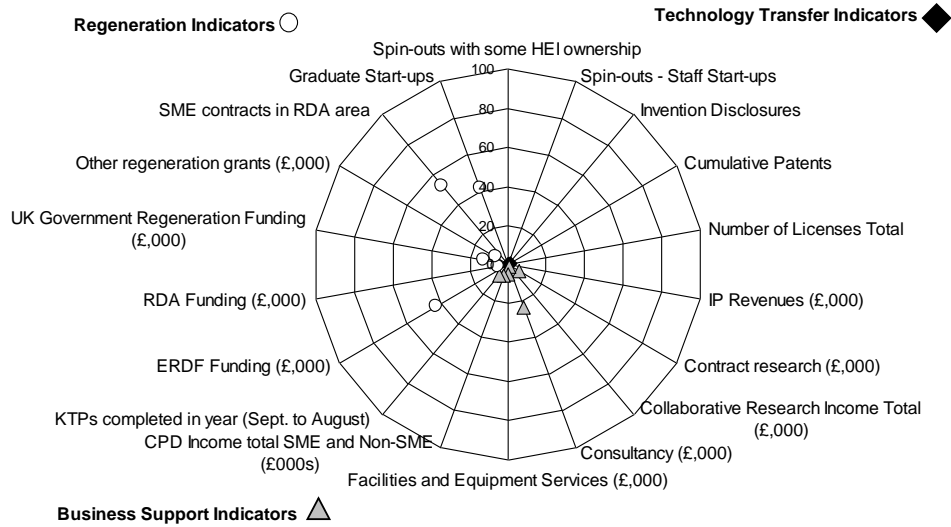
**Figure 2 Brighton University KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



**Figure 3 University of Cambridge KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**

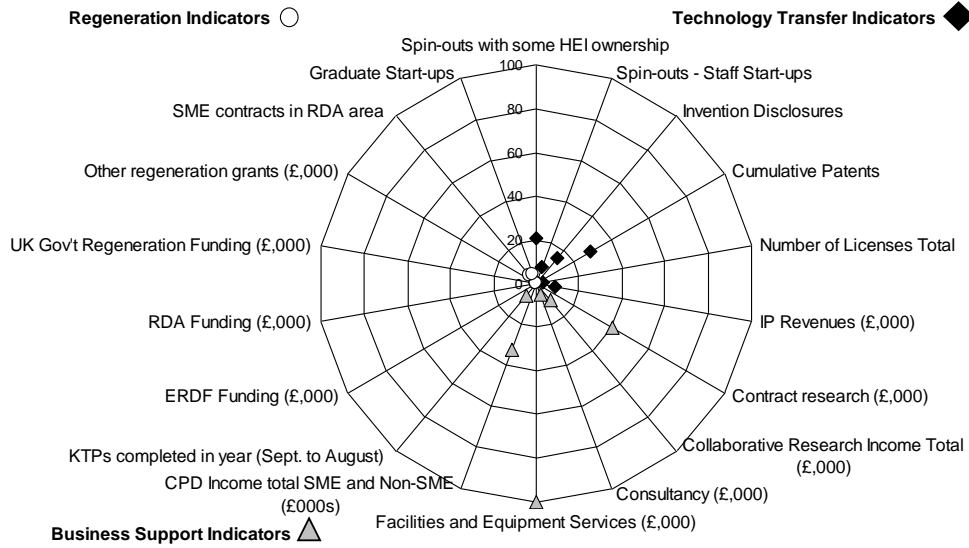


**Figure 4 University of Central Lancashire KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**

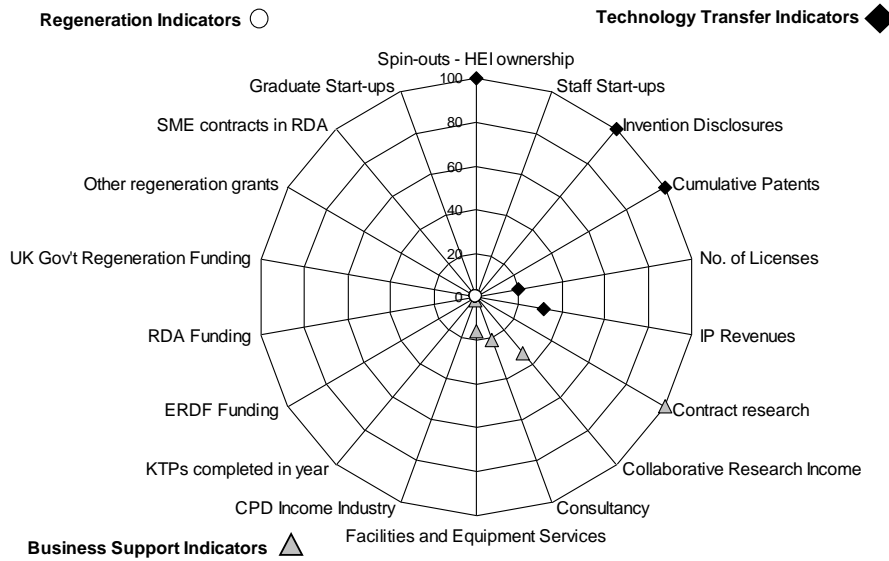




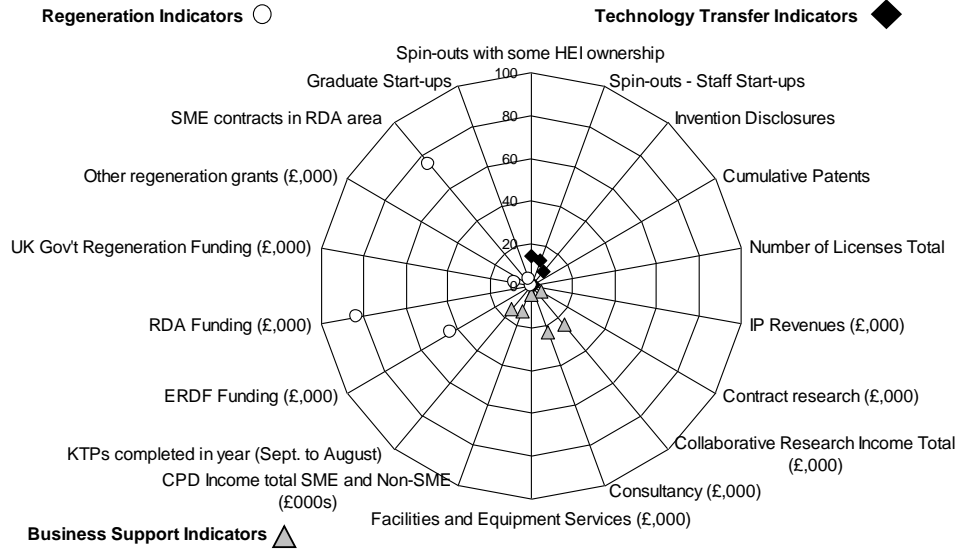
**Figure 5 University of Glasgow KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



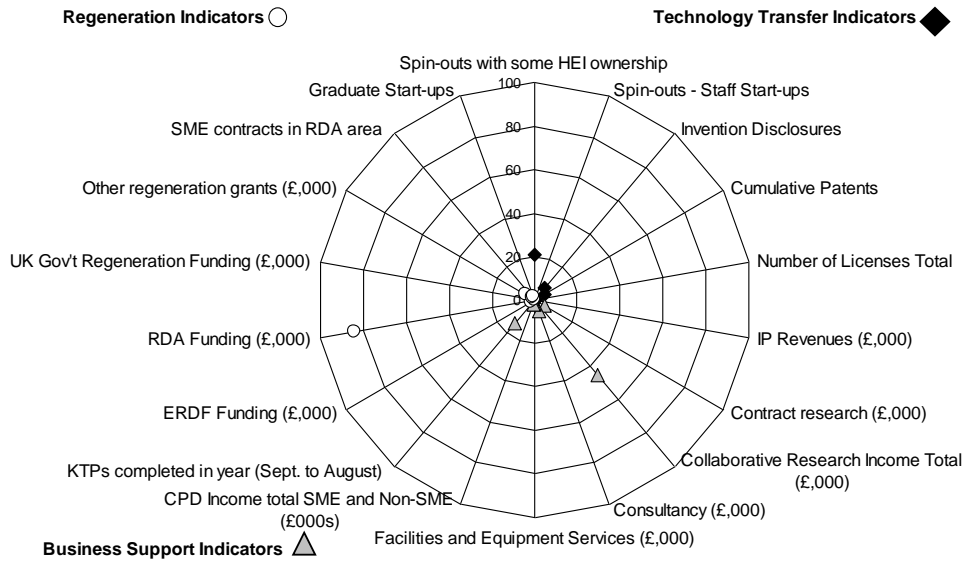
**Figure 6 Imperial College KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



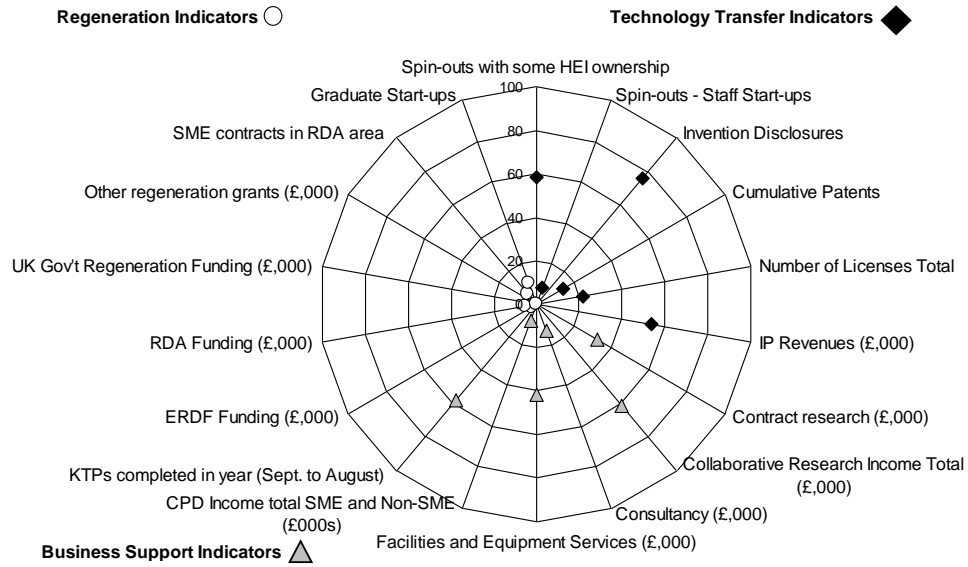
**Figure 7 Lancaster University KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



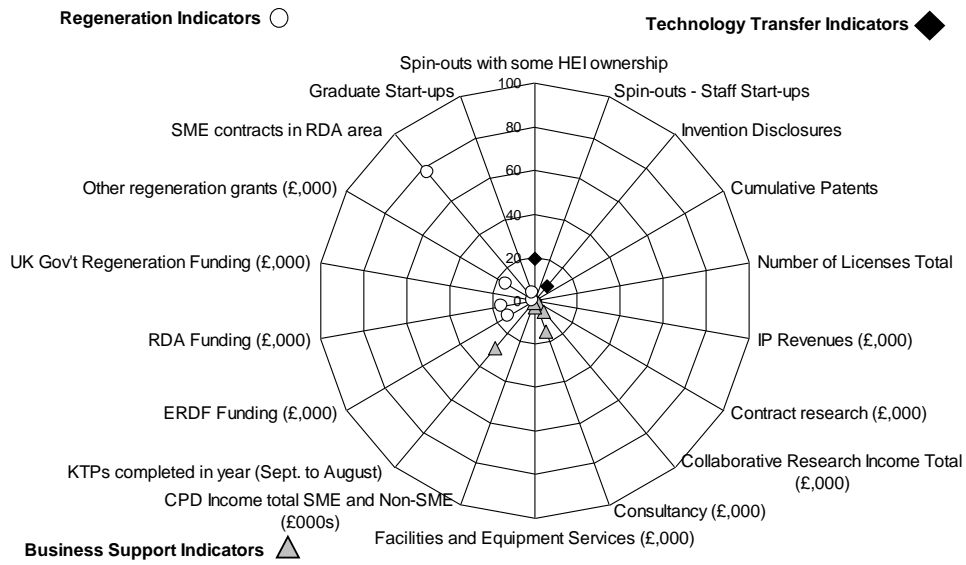
**Figure 8 Loughborough University KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



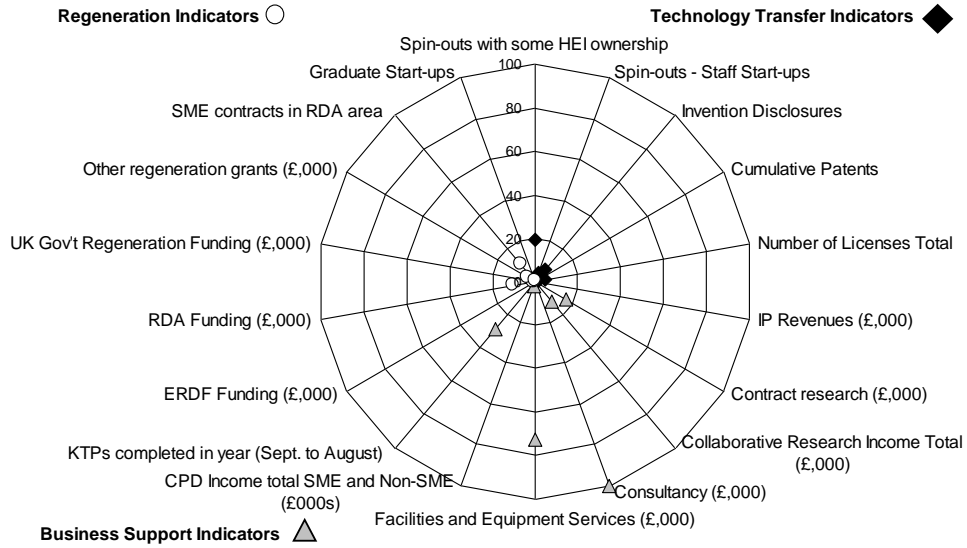
**Figure 9 University of Manchester KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



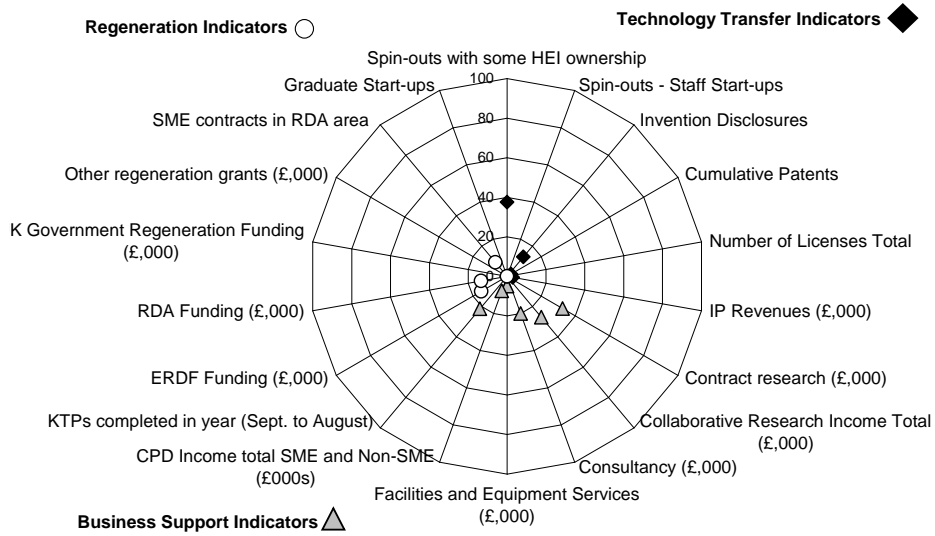
**Figure 10 University of Salford KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



**Figure 11 University of Surrey KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



**University of Warwick KT Indicators expressed as a percentage of the highest figure for any HEI 2006-7 (HEBCI survey figures)**



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