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Competencies and Continuing Professional Development (CPD) for Academics in Knowledge Exchange (KE) Activity

Report prepared for the
CONTACT Knowledge Exchange
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This project was funded by CONTACT Knowledge Exchange and carried out during 2005-06 by The Centre for People@Work at the University of Worcester under the direction of Dr. Jan Francis-Smythe. The project was intended to provide some primary research that could help to enhance academic[1] engagement in knowledge exchange. This was to be through an exploration of the competencies required by academics to successfully carry out knowledge exchange activities and the identification of barriers that are currently perceived to impede such engagement. The findings of the study are intended to help inform future CPD developments in the area and to provide pointers for change. The project findings are likely to be of interest to both Knowledge Exchange and Human Resources personnel involved in the mission of enhancing and managing academic engagement in knowledge exchange activity.

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[1] 'Academics' here defined as academics on a standard contract where job role is focused on teaching, research and administration and knowledge exchange is considered as either a replacement for one of these activities or in addition to these activities i.e. it is not a dedicated knowledge exchange role.

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Executive Summary

A comprehensive literature review first defines knowledge exchange (KE), knowledge transfer (KT) and knowledge sharing (KS) giving an overview of academics' potential involvement in KE/KT/KS as a 'broker' or expert source. The role of knowledge transfer professionals (KT Professionals) as knowledge brokers in the relationship between academics and clients is discussed together with an overview of the competencies they require and the CPD provision available to them. An introduction to ways that jobs/roles and competencies are analysed and defined, both generally and currently in the HE sector is then presented, together with an overview of the generic framework used in this research (SHL Universal Competency Framework). The review highlights the lack of consideration that has so far been given to academic KE activity in HR processes such as role/job analysis, appraisal and development, highlighting the need for a more empirically based exploration of the competencies required by academics for engaging in KE. In addition, the report presents an overview of current developments in a number of specific Higher Education Institutions (HEIs) focused on increasing KE academic activity, whether it be through creating hybrid academic/KT Professional roles or by encouraging more KE activity as part of the traditional academic role. The study addresses three questions:

What KE tasks/activities might academics engage in?
What competencies do academics need to successfully engage in KE?
What are the barriers to academics engagement in KE?

Knowledge Transfer Professionals (KT Professionals) and academics in each of the West Midlands HEIs were invited to participate. Qualitative research (focus groups using a variety of approaches) was used to generate ideas for testing more widely in a later quantitative (survey) phase of the study. Despite efforts to maximize engagement the level of participation in both the focus groups and the survey were relatively small (29, 60 resp. Total=89) across 7 institutions (although comparable to the national research carried out by AURIL (2006) with KT Professionals to update the CPD framework (total =94)). Of the 155 people who initially agreed to have their names put forward by their institutional representative 39% responded to the specific invite by the researchers to participate, of these, 57% were KT Professionals. There was a 50/50 split of KT Professionals and academics who participated in the survey. In terms of both tasks and barriers there was a relatively good consensus on ratings across participants suggesting a good degree of commonality in perceptions around the issues.

Findings
Seventeen KE activities were identified as most commonly being carried out (most frequent: giving presentations/conference papers, applied research, authoring practitioner/applied research books/journal articles and training). There was good consensus on the degree of KE experience required to complete a number of these tasks. In general, the results regarding the task/activities provide a valuable insight into *what* HEI employees perceive an academic is likely to be required to do when getting involved in KE and indicates the level of experience that they may require in order to complete

this. This should be of value for developing job/role profiles at different levels and in setting performance targets/objectives.

The study identified 263 successful behaviours associated with these activities which were categorized into 8 competencies according to the SHL Universal Competency Framework. A rank order list of competencies in order of importance was generated on the basis of numbers of behaviours identified in each competency. Two competencies, 'interacting and presenting' and 'organising and executing' were by far the most predominant. For each competency key example behaviours were identified (e.g. put information across concisely and easily accessible for client, provide clear schedule). These findings are compared to KE activity in other contexts (e.g. KT Professionals) as well as given consideration in the context of current HR processes in the HE sector. At a national level little consideration has yet been given to KE in respect of tasks/activities within national academic role profiles (where they are included it is relatively inconsistently). This omission has an impact on objectives setting and performance management (although from some case studies cited in the report a number of HEIs have now begun to include them). The issue of whether KE requires academics to use different competencies to those required for the tasks of teaching and research and scholarship is also considered. The level of contextual detail provided by the behavioural indicators and competencies from this study is important information that can be used in academic job design, selection, training and development, career planning and development and succession planning.

The study identified a total of 19 institutional (HEI) and 20 individual potential barriers to KE activity ranging from rewards and incentives through to risk aversion. The top 3 institutional barriers were: lack of reward/incentives for department, lack of investment in core academic/research KE staffing (i.e. mostly project-based), bureaucracy (form-filling) required to engage in KE processes. The top 4 individual barriers were: academic's time available to pursue KE is too fragmented, lack of academic's time to engage in KE, lack of reward/incentives for academic, mis-match of academic and commercial time-scales. The report discusses these findings in more detail, including differences between types of respondents (KT Professionals /academics) and institutions (not identified).

The findings of the study provide clear evidence as to the competencies and behaviours that academics need to be encouraged to develop in order to engage in effective KE, as well as highlighting important barriers that need to be addressed in order to facilitate this process. The report suggests that to further enhance academic engagement in KE this information needs to be utilized and embedded at both national and local levels in relevant HR processes.

1. Background to Study

1.1 What is KT, KS and KE?

Knowledge transfer (KT) has been defined in a number of different ways dependent on the context in which it is being used. Knowledge transfer infers a one-way process whereas knowledge sharing (KS) or knowledge exchange (KE) implies a mutual transfer of knowledge between parties. The preferred term now for knowledge transfer is knowledge exchange. This will be used in this report wherever possible except where reference is being made directly to previous work in specific transfer or sharing contexts or in the research element of the study where it is used because it is the term academics are most familiar with. KE is more than the simple passing of information between two parties; it is about transferring or sharing meaning (i.e. not just the content of a message but the meaning of it). Meanings are in people, in the message users, communications transfer messages not meanings and no two people have the same meaning for anything (Berlo, 1960). The receiver has to incorporate the message into their existing knowledge base for it to become new knowledge. This is important when considering modes of communication; we are not just aiming for messages to be exchanged but *meanings* (i.e. knowledge).The way in which the messaging is handled may have implications for the effectiveness of the exchange.

Currently, there appear to be two contexts in which KT and KS have been discussed in the knowledge management literature. The first is the transfer or sharing of knowledge between organisations. Typically, AURIL (Association for University Research and Industry Links, 2005) define knowledge transfer as: "the organised exchange and application of public sector funded research, intellectual property (IP), expertise and training to meet business and community needs". The ESRC definition emphasises the sharing aspect of KT between organisations saying that "Knowledge transfer is about exchanging good ideas, research results, experiences and skills between universities, other research organisations, business, government, the public sector and the wider community to enable innovative new products, services and policies to be developed". The second context concerns knowledge sharing within organisations i.e. between members of the same organisation principally for the purpose of transfer of best practice and organisational learning (Lucas, 2005). Both will be reviewed here in the context of providing useful pointers of best practice.

This project explores KE from a Higher Education Institution (HEI) perspective and as such defines KE as:

> The mutual transfer of knowledge and expertise between a knowledge-based organisation, and other external organisations and the community, with the objective of contributing to economic and social development. The 'knowledge' may have been generated (through applied research), acquired through scholarship or experience and involve both staff of each organisation and /or students.

1.2 KE Brokers

There has been increasing investment in knowledge exchange activity in recent years. From an early stage the focus has been on the development and utilization of 'knowledge transfer broker' roles, designed to facilitate the knowledge transfer between the knowledge 'expert' and the client. These individuals are often referred to as Knowledge Transfer Practitioners or Professionals (KT Professionals), people employed by HEIs, public sector research establishments (PSREs), industry and in a variety of intermediary organisations to create, facilitate and sustain knowledge and technology activities. In 2003 AURIL developed a CPD programme for KT Professionals which has been recently revised and updated. More recently, AURIL has developed a Knowledge Transfer Professional Institute, as a means of recognising and developing the professionalism and status of those working in KT. Praxis is also a national training programme aimed at technology transfer professionals working in universities, research institutions and industry that delivers professional training and development courses for personnel in technology transfer offices in the UK.

Despite this, provision for KT Professionals still appears somewhat incomplete. The Business Interface Training Provision (BITS) review in 2002 of training provision for KT Professionals identified that "Although training providers are addressing most of the essential knowledge and skills areas, there is no integration with the context in which KT managers and practitioners operate and the way in which this effects the actual tasks they undertake. Areas that are thought to be contextual include science policy, HE policy, business and academic cultures – including managing change in changing environment - and government schemes "(p.ii).

These developments have all been based principally on the 'brokerage' model, and the KT Professional personnel targeted are either 'brokers' (e.g. Business Development Manager, Technology Transfer Officer etc.) or academics almost wholly engaged in commercial research activity.

1.3 Academic roles in KE – Broker and Expert Source

With the advent of the White Paper on "The Future of Higher Education" (January, 2003), the Lambert Review of Business-University collaboration (December 2003) and the Higher Education Funding Council's HEIF (Higher Education Innovation Funding) 'third-stream' initiatives (from 1999) there has, in recent years, been a strong call for the strengthening of university and industry/community links to contribute more significantly to the knowledge economy. This call has applied to all HEIs, research and non-research intensive alike, and has heightened awareness of the need for all HEIs to consider ways in which they can actively engage in knowledge transfer, whether it be from the application of research, the dissemination of expertise through consultancy or the transfer of best practice through CPD programmes. This, in turn, has brought the focus for delivery of the KE activity far more prominently on to the 'academic'. The extent to which the existing role definitions, person specifications and training and development provision for KT Professionals might be usefully applied to academics in this context has not really been fully explored. The BITS Review made some reference to this by suggesting a broader need for training, other than KT Professionals, referring to the potential new development

of interactive training materials as "a useful resource for technical specialists working outside a centralised KT office/unit (i.e. the 'distributed activity') as well as those working on the wider aspects of KT (i.e. activities that are not focused on technology transfer or the commercialisation of research)" (p. 5).

In 2006 the Higher Education Funding Council (HEFCE) embarked on a programme entitled 'Enhancing impact through good practice in knowledge transfer and exchange' which through a series of workshops and working groups aims to distil and share good practice in KE. The programme is directed by a national steering group, supported by a coordinator and a process framework, comprising six streams of the KE function and has been developed to provide structure for the good practice and KE development. While some illustrative good practice case studies are currently displayed as on the website (http://www.hefce.ac.uk/reachout/casestudies/list.html), the programme aims to deliver generic transferable good practice models (recipes) online and facilitate the development of communities of practice.

One example of the currently displayed case studies is the Medici Program, a fellowship scheme which began in 2002. The programme is funded by HEIF, led by the University of Birmingham and in 2006 involves 15 Midlands universities. Subject-specialist Fellows are appointed for a period of one year to focus on technology transfer and commercialization of research with peers in their own subject area. The Fellows have both regional and local training similar to a mini-MBA equivalent to 30 days. Liverpool John Moores, in a similar vein, has school-based Enterprise Champions, Aston University Innovation Fellows and University of Worcester KTIE (Knowledge Transfer Innovation and Enterprise) Fellows.

Other HEIs have focused on providing resources aimed specifically at increasing individual academics KE activity. Typically, Bournemouth University has appointed Business Fellows who dedicate 10-50% of their time to KE activities and Nottingham Trent University has provided selected academics with funds to spend half a day a week, for up to one year, with a client to transfer knowledge and develop a relationship which will deliver benefits back to the institution. Similarly, some of the Research Councils (e.g. BBSRC) have Enterprise Fellowship awards aimed at commercialising specific research. In addition to this, HEIs have varying numbers of academics engaged in KE activities either full or part-time.

Increasingly, HEIs are working towards developing infrastructures to better support, promote, recognize and reward academics for engaging in third-stream activity. Notably, for Sunderland University where "third stream" activity is now an embedded part of the culture, the implementation of strategic and operational frameworks and support systems have been central to achieving increased engagement in third stream activity by academic staff. The introduction of comprehensive workload models and the Framework for Personal Development and Career Progression for Academic Staff which place third stream as an 'equal partner' to teaching and learning, and research have made a major difference. Specific Reach-Out training is available to staff, covering: External Work (University policy and procedures), Business Planning, Initiating and Managing External

Work (University costing, pricing, tendering, invoicing procedures), Solutions-Winning more Business (University corporate brand, marketing, media and support from Business development Team), and Knowledge Transfer Partnerships (an introduction). Four years ago, 45% of the School of Computing and Technology were reach-out active, now it is up to 75%. Uptake of courses on enterprise and exploiting intellectual property has doubled in the last 2 years. In addition to the Reach-Out programme there is a Responsiveness programme which includes a range of Customer Care skills courses; it would be interesting to know the extent to which academics have engaged with this course. The Framework for Personal Development and Career Progression for Academic Staff at Sunderland identifies the nature of the evidence of achievements/activities required for demonstrating competence in Reach-Out.

The University of York are currently exploring how to develop a modular training and development programme aimed at potentially entrepreneurial academics integrating third stream activity into the performance review/appraisal/promotion process to embed the agenda as a core activity of the University and further change the culture.

There is also some evidence of private provider provision of training. Typically, Blueberry Training provide a Knowledge Transfer Skills Development programme for a range of people involved in KE including academics focusing on Identifying capacity and capability, Understanding the market, Understanding the customer, Business communication, Negotiating the deal, Project management, Risk Management and Building client loyalty.

These examples demonstrate the way in which the knowledge exchange function is increasingly being taken on by academics either in a 'brokerage' capacity or, of more relevance to this project, directly, as an expert source. Whilst there is some discussion about the nature of the KE activities academics should engage in, the authors are not aware of any empirical research which has been reported on the required outputs or competence, and the suggested training academics might need to develop this competence. This research sought to address this gap.

1.4 Human Resource Processes – Role Analysis and Competency Modelling

Job or role analysis has been traditionally used in organisations to profile jobs or roles in terms of the tasks, roles and responsibilities associated with them, often leading to the development of job or role descriptions. However, competency profiling is now increasingly being used which places the focus on 'competencies' (defined by Robertson, Callinan & Bartram (2002) as "sets of behaviours that are instrumental in the delivery of desired results or outcomes". and which generally results in a person specification as opposed to a job or role description. Once either a job/role analysis or a competency model has been produced, training needs analyses (TNAs) can be conducted and used to help identify the 'gaps' where individuals, roles or the organisation need training and/or development to equip people with the knowledge and skills required to deliver the job/role performance outcomes.

The focus of this project is on competencies. It is important to distinguish between competency and competence. According to Kurz and Bartram (2002,p. 230) "A competency is not the behaviour or performance itself but the repertoire of capabilities, activities, processes and responses available that enable a range of work demands to be met more effectively by some people than by others….Competence relates to performance or outcomes, and involves the description of tasks, functions or objectives". "Competencies, however are concerned with the behaviours and the underpinning successful performance; what it is people do in order to meet their objectives; how they go about achieving the required outcomes; what enables their competent performance" (p.235).

Competency models or frameworks tend to be comprised of a set of generic competency dimensions such as Communicating, Deciding, Leading, for example, which may then be sub-divided into further categories before finally listing typical actual behaviours (often called behavioural indicators). These models are called hierarchical job competency models. Many organisations have developed their own competency frameworks often with little commonality between them. Recently, however, researchers have begun to develop generic models of workplace competency (e.g. Bartram et al. 2000; Borman and Brush 1993; Tett, Guternamn, Bleier & Murphy, 2000). These models are generic and scientifically validated and therefore offer a good basis from which to develop new models for use in any workplace application.

One of these frameworks, the Great Eight (Bartram, Robertson, & Callinan, 2002; Kurz and Bartram, 2002), is particularly interesting because recent research with this model (Bartram, 2005) has identified key personality and ability predictors for each of the competencies. It has been shown, for example, that the competency Interacting and Presenting is best predicted by the personality factor of Extraversion (defined as warmth, gregariousness, assertiveness, activity, excitement-seeking) i.e. an extroverted person is most likely to find it easier to display this competency than an introverted one. So, if one can identify the most important competencies for a job from this generic framework, it is likely that these particular personality/ability predictors will also apply, thus aiding the selection and development process. The Great Eight framework was developed based on an analysis of a wide range of published and practitioner models. It identifies 8 competency domains which are further broken down into 20 competency dimensions and 112 competency components. The 8 competency domains and the identified predictors are shown in Table 1 below. This generic framework was used as a basis for the competencies element of this project.

Table 1. The Great Eight framework and associated predictors

	Competency Domain	**Predictors**
1	Leading and Deciding	Need for power and control Extraversion
2	Supporting and Cooperating	Agreeableness
3	Interacting and presenting	Extraversion, general mental ability
4	Analysing and Interpreting	General mental ability, openness to new experience
5	Creating and conceptualizing	Openness to new experience, general mental ability
6	Organising and Executing	Conscientiousness, general mental ability
7	Adapting and coping	Emotional stability
8	Enterprising and performing	Need for achievement, negative agreeableness

These competency titles are taken from the SHL Universal Competency Framework ™ Profiler and Designer cards (copyright © 2004 by SHL Group plc).

1.5 Human Resource (HR) Processes in HEIs

The following review gives a brief summary overview of the current situation in HEIs. A review of Emerging Practice in Staff Appraisal and Review carried out by the Higher Education Staff Development Agency (HESDA) in 2004 (http://www.hesda.org.uk/activities/projects/ssda/app_report.pdf) showed some evidence of institutions working to define the skills and competencies associated with particular jobs and embedding these in competency frameworks to help identify both performance targets and personal development needs, although the use of such frameworks in appraisal was noted as not yet widespread. Typically, in March 2003 the Office of Public Management commented that in HEIs, "common tools and techniques were either not being used fully, or being inappropriately applied". In June 1999 the Independent Review Committee under the chairmanship of Sir Michael Bett recommended that job evaluation be introduced to underpin reform in pay structures within Higher Education. This led mainly to the use of either HERA or the Hay job evaluation scheme in HEIs.

HERA is a role analysis tool used to support recruitment, selection, promotion, training and development needs analysis, career planning and job evaluation. HERA is very much a traditional competency-based tool with competency dimensions such as 'communication', 'team work and motivation', 'planning and organizing resources' with 3 levels of behaviours: base, standard and exceptional. The behaviours are context-free and hence each of the behaviours/competencies could in principle be applied to any job or role. Consequently, it should be possible to analyse and compare any job using

this scheme. It is important to note that the focus lies on competencies not functions or tasks.

HERA currently comprises 14 competency elements:

- Communications
- Teamwork and motivation
- Liaison and networking
- Service delivery
- Decision making processes and outcomes
- Planning and organizing resources
- Initiative and problem solving
- Analysis and research
- Sensory and physical demands
- Work environment
- Pastoral care and welfare
- Team development
- Teaching and learning support
- Knowledge and experience

More recently an additional 4 have been developed:

- Leadership
- Influencing skills and impact
- Tenacity
- Change Focus

In 2004 JNCHES (Joint Negotiating Committee for Higher Education Staff) introduced a role profile analysis tool for use by HEIs providing institutions with sample role profiles to adapt to their own use but importantly to allow them to benchmark academic jobs for pay purposes. This was brought in because not all HEIs were using HERA, i.e. some were using Hay, and a common approach was required. The role profiles (amended January 2005) are indicative, not definitive, and are intended to describe the demands and responsibilities required of most members of academic staff employed by UK HE institutions.

A training needs analysis (TNA) review project in HEIs was carried out by the Higher Education Staff Development Agency (HESDA) in 2004 **(**http://www.hesda.org.uk/activities/projects/ssda/tna_report.html) to explore the extent to which HEIs are identifying training and development needs – institutionally, occupationally or individually. This showed that lecturers and academic staff were the group most frequently named as being the subject of a review of their developmental needs. The most common area being analysed for developmental needs was management development (32%), followed by Communications and Information Technology (C&IT) (29%) and Teaching and Learning (25%). There was no mention of KE.

As noted previously, many HEIs have or are developing their own HR processes in addition to or instead of those cited here.

1.6 KE and HR in HEIs

The traditional 'academic' job role has generally comprised the functions of (i) teaching and learning, (ii) research and scholarship and (iii) administration. One of the issues the sector appears to be grappling with currently is the extent to which KE is another 'academic' function. For example, some might argue that applied contract research and consultancy is a form of research and scholarship, and that delivering short courses to professionals is a form of teaching and learning. For others, these are distinct areas of activity which should therefore be categorized under a fourth function - KE (although it is generally placed as the 3rd function, before administration, in line with the government's focus on 'third-mission activity').

The JNCHES role profiles (previously described) subsume KE activities within teaching, research and scholarship and do not identify them as a separate function. These role profiles identify tasks/activities to be carried out in 3 types of academic roles ((i) Teaching and Scholarship (T and S), (ii) Teaching and Research (T and R) and (iii) Research (R)) at up to 5 different levels. The activities are grouped together under headings very similar to the HERA competency headings, typically, Communication, Teamwork, Managing People etc. The activities cited under each heading are specific and contextual to that particular role, for example, Teamwork in a Teaching and Scholarship role has the activity 'Actively participate as a member of a teaching team' whereas in a Research role it is 'Actively participate as a member of a research team'. Whilst most of the headings are similar to the HERA framework 'analysis and research' becomes 'research and scholarship' and importantly for this project 'Service delivery' disappears. Whereas any teaching or research activities are classified under their own heading, any typical KE activities become subsumed under any one of the other headings. Perhaps, more importantly, there is also inconsistency in this respect. The activity of 'consultancy' appears under different headings in different role profiles, typically sometimes in Liaison and Networking (T and S, level 3), sometimes in Planning and Managing Resources (T and S Level 4) and sometimes in Research and Scholarship (R – Level 5). Additionally, because the descriptors teaching and research are much more functional labels than the generic headings in the rest of the profile, this leads to some problems classifying the activities. Typically 'assess student progress and provide feedback' appears under teaching and learning support and yet 'provide feedback to students' is surely a communication behaviour like 'writing handouts', which appears under Communication. In essence, these role profiles tend to be a mix between a competency framework and a task-based role analysis and most importantly, in their current form, do not really accommodate KE activities or the behaviours/competencies required to carry them out. For example, service delivery has been omitted from these profiles and yet this would seem to be a key feature of KE activity. Interestingly, as outlined earlier some HEIs (e.g. Sunderland University) are treating KE as a separate function and are beginning to develop appropriate HR systems to accommodate this.

The HERA competency framework is generic. The question is whether this competency framework is comprehensive enough to allow description of the key behaviours needed to effectively engage in KE? If it is not, then it will not adequately describe the role/job, people will not be selected according to job needs, they will not be trained or developed

to carry out the behaviours required nor rewarded appropriately and therefore outcomes may not be achieved. Part of the purpose of this project is to identify the competencies academics require to carry out KE. The results of this process should provide an insight into whether the HERA framework can accommodate these.

Several questions might be asked at this stage. Firstly, what does a role and/or job analysis tell us about the tasks requiring completion by the academic? (role is generic e.g. Senior Lecturer, job is specific e.g. Senior Lecturer in Marketing). Role/job analyses typically classify roles/jobs into functional areas (e.g. teaching and learning, research and scholarship, administration) and then identify required activities or tasks within these (e.g. set and mark assignments, write up research work for publication). The question is, does it matter if we include specific KE activities/tasks in the research and/or teaching and learning functions? What benefits are presented either way? At this level – analysing the job, it probably does not matter. However, for the next stages of the HR process, e.g. writing a person specification, selecting a person for the job, assessing and rewarding their performance and developing them, it probably does. This is because for each of these processes we are increasingly looking at the *way* in which people do their jobs, that is the competencies they require to achieve the task outcomes.

The key question is: are the competencies required to carry out KE activities different or the same as those required to carry out the more traditional activities defined under teaching and learning and research? If they are not different, then maybe it does not matter if they are subsumed under the same function. However, if they are different, then it is important to discriminate between them so that appropriate recruitment, selection, assessment and development processes are put in place to ensure maximum effectiveness within each job function, and, specifically with respect to this project, within KE. To begin to address these questions we first sought to establish what the competencies are.

It is not only for reasons of job effectiveness that this should be carried out. In a different but related context, Briggs (2005, p.265) explores the changing roles and competencies of academics in the light of the need to adapt to new on-line teaching environments. They ask "whether universities should continue to allow roles and competencies to evolve or whether it is now appropriate to intervene to define roles and develop competency frameworks" suggesting that "by clearly defining roles and competencies universities can perhaps control the impact of change and indeed shape change". They allude to the fact that role changes can lead to role conflict, overload and ambiguity, all with subsequent potentially negative effects on satisfaction and performance. This implies that if the activities and/or competencies for KE are different, they should be clearly defined for both the individual's and the organisation's benefit.

This review has thus far defined knowledge transfer/sharing/exchange, given an overview of academics potential involvement in KE as a 'broker' or expert source, presented an introduction to ways that jobs/roles and competencies are analysed and defined both generally and currently in the HE sector culminating in the suggestion that it is now timely for a more empirically based exploration of the competencies required by academics for engaging in KE.

In order to do this, it was deemed important that there was a common view of the nature of the tasks and activities that could be classified as KE. Appraising the case studies cited earlier, it would appear that the list might comprise: commercialising research, managing and delivering Knowledge Transfer Partnership programmes, consultancy, delivering short courses and presenting at external events. However, evidence of lack of clarity in this respect is well summarized by Sunderland University in their good practice case study (http://www.hefce.ac.uk/reachout/casestudies/13rr.doc):

> Some early applications for career progression incorporated claims for third stream activity which demonstrated some confusion among academic staff about what third stream is, and how it is differentiated from activity within teaching and learning, or research. This led to the university developing the framework thresholds further to make it clear to staff applying what would be considered as third stream, and what would belong elsewhere. It also led to the clarification of what kind of third stream activity fits with the university's corporate and academic strategies, as well as being part of our KPIs used to set targets and monitor performance. As a result, the nature of, and strategic targets for, third stream activity are much more clearly understood throughout our academic body.

Given this lack of clarity over what is and what is not classed as 'third-stream' activity, the first research question this project sought to answer was:

Research Question 1
'What KE tasks/activities might academics engage in?'

From this, the competencies required to successfully engage in these KE activities would be explored.

1.7 KE competencies / skills

A review of the literature and reports of best practice related to knowledge transfer by KT Professionals and knowledge sharing in organisations may give some insights into the nature of the competencies required by academics for engaging in KE.

1.8 KT Professionals skills

The AURIL 2006 CPD framework for KT Professionals identifies 10 Key Roles:

- Manage Information and Communication
- Manage Relationships
- Manage Projects
- Manage the Commercial Interface
- Manage Operations within a Legal Context
- Problem Solve and Manage the Decision Making Process
- Manage Finance in your own area of responsibility
- Provide Leadership in your own area of responsibility
- Manage Risk
- Help clients to meet their business needs

As part of the update process in 2006, the research was also trying to understand more closely the skills and competencies that KT Professionals require in order to fulfil the responsibilities of the job role. As such, it also sought to identify the relative importance of the following skills:

Communication skills
Facilitation skills
Selling skills
Oral presentation skills
Negotiating skills
Financial awareness and ability to use financial data and indicators
Skills and awareness of related legislation
Marketing skills and marketing awareness
Time management skills
Conceptualization skills
Business planning skills
Project management skills
Skills concerned with enhancing commercial insights
Administrative skills
Public relation skills
Entrepreneurial skills
Leadership skills

Although the results of this process are not yet available, the list itself is suggestive of the range of skills that are thought to be required by KT Professionals.

1.9 KS skills and competencies

The knowledge-sharing literature provides some insights to competencies required. Research by Truch, Bartram and Higgs (2004) sought to explore the role of personality on peoples' ability to 'knowledge share' within an organisation, specifically by firstly identifying knowledge sharing behaviours and secondly, identifying links between these behaviours and personality. Knowledge sharing, as defined earlier, is about creating a meaning of a message for oneself. The importance of relationship in the form of trust and commitment has been noted as key to the process of knowledge sharing (Mayer & Davis 1995; Liedtka & Haskins1997; Jarvenpaa & Leidner, 1998). Truch, Bartram and Higgs (2004, p.133) claim it is the relationship that can help with the 'meaning' by helping to discover '"that which we have not been able to communicate". The knowledge sharing behaviours they identified were classified into 3 key competencies and the personality traits that best predicted these were identified as shown in Table 2.As with the suggestion made earlier with respect to the predictors of the Great Eight competency framework, these predictors may be useful in selection and/or development processes. Those with the predicted personality characteristics may find the behaviours come naturally, for others they may be more difficult to adopt or learn.

Researchers have proposed that there are 5 basic elements that influence KT and KS: the channel, the message, the context, the recipient and the source (Lavis, Robertson, Woodside, McLeod, & Abelson, 2003; Szulanski, 2000). In the context of this project,

the source can be equated to the academic. Sarker (2005) provided empirical support for the role of credibility and communication on KT in cross-cultural distributed teams.

Table 2. Competencies and predictors for KS (Truch, Bartram and Higgs, 2004)

	Competency	**Personality Predictor**
1	building relationships • networking • consideration and recognition • trust and empowerment	Relaxed Gregarious Sympathetic
2	building knowledge base • gathering and developing knowledge • managing and sharing information	Relaxed, extrovert Gregarious Imaginative
3	building knowledge value • communicating knowledge • applying expertise	Imaginative, relaxed Gregarious

Credibility
Credibility is defined by Sarker (2005) as trustworthiness (the extent to which a team member is relied on by other team members) and reputation (extent to which a member is viewed as being a performer by other team members). According to Lucas (2005), "Trust and reputation develop over time, are closely guarded by its representatives, and must be nurtured and protected".

Trust
Trust has been proposed as important determinant of KT by Yoo and Torrey (2000), Ichio (2000), Levin (2004) and Lucas (2005). According to Lucas (2005, p.89):

> Trust is the willingness of one party to be vulnerable to the actions of another party, and it is a function of access to information either through direct or indirect interactions (Mayer,et al;1995; Shapiro,1987). Where trust exists, it enhances the likelihood of resource exchange between trusting parties, decreases transactions costs because there is less need to undertake actions to protect one's interests, makes knowledge transfer less costly and increases the likelihood that newly acquired knowledge can be absorbed and retained (Currall and Judge,1995). Trust allows one to focus on other issues knowing that those with whom we are involved will either protect our interests or not engage in activities that are harmful.

Others have noted the importance of good personal relationships, particularly those with a long and favourable history, to facilitate trust (Child and Rodrigues, 1996; DeLeo, 1994).

Truch, Bartram and Higgs (2004) claim: "The importance of relationship (trust, commitment) has been studied as a key factor in the process of knowledge sharing – it is the relationship that can help the person addressed in discovering 'that which we have not been able to communicate".

Lucas (2005, p.90) also suggests:

> Knowledge acquirers who trust knowledge providers are more likely to listen to, absorb, and act on the information provided by the latter to support knowledge transfer (Levin and Cross, 2004). Acquirers see the knowledge as being useful and having the ability to positively affect the way they do their jobs. With trust, acquirers know that all relevant information to enhance the chances of successful transfer will be provided and clarified through repeated contacts between the parties (Teigland and Birkinshaw, 1999). Similarly, the knowledge providers support the transfer efforts because they know that the actions of the acquirers are not intended to be harmful. Trust between knowledge transfer parties results in full disclosure. As a consequence, there is a willingness to support the transfer efforts through continuous interaction and feedback.

Reputation

According to Lucas (2005) reputation is gained through one's own or others past experiences of others behaviours and is the opinion of others about the ability of someone to provide the services expected in knowledge transfer activities. Additionally, the reputation of the receiver is considered an important determinant as to whether the provider will engage, much is at stake and the provider needs to know the KT process will be successful and their reputation for delivering preserved.

Lucas (2005, p.91) states:

> With full disclosure, both employees expect that what is not understood by the employee adopting the knowledge (receiver) will be clarified by the employee providing the knowledge (provider) (Snyder, 1997). Prior research has shown that frequent visits by personnel from the provider enhances their reputations and increases the likelihood that knowledge transfer efforts will be successful (Teigland and Birkinshaw, 1999).

Communication

In a study by Davenport and Prusak (1998) communication was defined as the extent of participation in online chats, threaded discussions and other forms of communication. They claim (p.90-91) that "in a knowledge-driven economy, talk is real-work', 'it is through extended discussions that an individual's ideas, viewpoints, and beliefs are shared with, and made available to others". The best knowledge-sharers were perceived to be trustworthy and engaged in a high amount of communication, electronic or otherwise.

At the heart of successful KE then is the building and sustaining of relationships based on trust and reputation through frequent communication. Whether this communication is through face-to-face or virtual should not matter. However, no empirical research

appears to yet address this. It would be interesting to know if the more informal on-line messenger lines and 'chatty' emails go some way to act as a mid-way between formal written communication and face-to-face.

Interestingly, Lavis et.al. (2003) claim that if researchers have the 'skills and experience' to act as the messenger, their credibility will make them the best choice; but what do they mean by 'skills and experience'? They suggest using a knowledge broker might get round the skills and interest deficit and time constraints of using a researcher. However, this might be a compromise on credibility. Enhancing the skills and competencies of the academic to carry out the KE is likely to make it the most effective.

Academics as consultants

The issue of the importance of credibility has been alluded to in the literature when discussing the role of academic researchers as consultants. Jacobson, Butterill and Goering (2005) in mentioning the fact that policy-makers often find it difficult to grasp the implications of academic research, suggest that consulting is an effective strategy in KE, where the researcher enlightens the user (enlightenment model) and KS, where the researchers and users develop the knowledge together (interactive model). They define consulting as "a process of transferring expertise, knowledge, and/or skills from one party (the consultant) to another (the client) with the aim of providing help or solving problems" (p.302). The extent to which the client 'drives' the whole process has been alluded to by Howell (2006, personal communication) who suggests a matrix of 9 consultant roles from 'Design and Build' (provide a bought-in full-service solution) through to 'facilitator' (help client identify solution which they then carry out).

Jacobson et al. (2005) suggest consultants are chosen on the basis of credibility, expertise, trust and rapport and that clients are more likely to use the knowledge if the consultant is perceived as 'accessible, organised, expert and credible'. In an article in the Times Higher Education Supplement (Shepherd, February 3, 2006) Stephen Allott, a former consultant at McKinsey and ex-Director of Development at Cambridge University Computer Laboratory says: "A successful academic consultant will have excellent listening skills, problem-solving ability, no ego and focused creativity as distinct from random creativity". Similarly, Mark Taylor, Head of Business Innovation and Consulting at Isis Innovation, Oxford suggests that "Academics need good listening skills to be successful consultants".

This section of the review has outlined the skills perceived to be required by knowledge transfer brokers and also knowledge sharers within organisations. Additionally, and more specifically, the literature on academics as consultants reveals similar suggestions, inferring therefore some convergence in the competencies required across each of these contexts. It would seem that typically, credibility (trust and reputation), expertise and communication are all essential components of the competency/skill set.

The second research question therefore was:

Research Question 2

'What competencies do academics need to successfully engage in KE?'

1.10 Barriers to KE

Defining the role and the competencies required and putting in place mechanisms to help develop these competencies is obviously crucial to the task of promoting and enhancing academic engagement in KE. This alone is not enough, it is also important to recognize and attempt to address any barriers that may exist and prevent or deter academics from engaging. Some recognition of this and an indication of such barriers already exist in the literature. Typically, Michailova and Husted (2003, in Lucas, 2005) suggest one of the impediments to KT as being the obstructions created by individual behaviour. Crosswaite and Curtis (1994) suggest culture, time frames and language are barriers to KT and the Medici programme alludes to the fact that the fellows might have the 'right' personality characteristics to act as a change agent but they might not have the degree of personal autonomy needed or the positive organisational climate necessary for technology transfer (Alexander, Tann & Elliott, 2005).

Jacobson, Butterill and Goering (2005) suggest many characteristics of universities and other academic organisations that make knowledge transfer and alternative models of research practice a difficult undertaking: "The structure of academia is such that members of the academy, individually and collectively, are largely accountable to their disciplines; ideas for new research therefore must be situated in the questions and methods of the discipline. Legitimacy is obtained through peer review of process and product. Rewards and incentives like tenure and promotion are dependent on meeting disciplinary standards. Thus, for consulting to be more widely embraced, academia must change some of its own structures and practices" (p.317).

Yih-Tong and Scott (2005) investigated the barriers to KS and their sources that occur within an organisation between four different levels of learning: individual learning, team learning, organisational learning and inter-organisational learning. The barriers and sources of these barriers that they identified were: individual competence issues and characteristics such as lack of communication, lack of trust, divergent objectives, fear of failure/inadequacy, fear of loss of ownership, limiting culture, lack of reward and recognition and lack of infrastructure to support. The authors suggest that knowing how to overcome individual imperatives is critical to the study of barriers to knowledge transfer. Accepting that this work was carried out in a context different to this study, looking at KS between different levels of an organisation, the principles of the existence of individual and organisational barriers still apply.

Finally, if engaging more in KE is deemed to require academics to engage in more continuing professional development (CPD), what might be the barriers to engaging in CPD? King (2004) in a study titled 'What do academics do?' surveyed 192 academics reasons for not engaging in CPD and reported that 84% of the sample cited lack of time, 53% the emphasis on research, 21% lack of funding, 23% lack of personal interest and 12% as lack of encouragement as barriers to engaging in CPD.
The final research question then became:

Research question 3:
'What are the barriers to academics engagement in KE?'

2. Methodology and Findings

The study sought to answer the following questions:

- What KE tasks/activities might academics engage in?
- What competencies do academics need to successfully engage in KE?
- What are the barriers to academics engaging in KE?

The literature review revealed that to date these questions have been mainly looked at from a general KE perspective with varying levels of detail. However, no specific information is available with regard to academics' involvement in KE. For the initial stage of the data collection, a qualitative approach involving focus groups was taken. This was followed by an on-line survey collecting qualitative and quantitative data.

2.1 Qualitative study – focus groups

2.11 *Participants and procedure*

Three groups of individuals with different degrees of involvement in KE academic activities in an HEI context were involved in order to give a holistic picture: 1) KT professionals, e.g. KT staff in Regional Offices, Business Development Managers etc.; 2) Academics with a dedicated KT role e.g. Medici or Innovation fellows and 3) academics who engage in KT as part of their normal academic contract.

67 KT specialists, 41 academics with a dedicated KT role and 47 academics without a dedicated KT role (nominated by institutional third-stream regional representative) were approached by email. In the email they were briefed on the background to the study and invited to participate at their preference either in a focus group and/or a telephone or email survey. Overall, 32, 10 and 14 responses were received respectively, representing an overall response rate of 39%.

11 KT professionals, 2 academics with a dedicated KT role and 2 academics without a dedicated KT role opted for participation in focus groups. Participants were presented with a range of optional dates for three venues in the West Midlands and sessions were arranged according to their preferences and/or availabilities.

The focus groups were conducted in February 2006 in Aston, Coventry and Staffordshire University with 7, 6 and 16 participants respectively. Attendees on each date were split into two groups. Where possible, participants from the same academic institution were separated into different groups to diversify perceptions and discussions in each group. Experienced facilitators led the groups through the sessions which were taped.

Tasks/activities

An unguided brain-storming was conducted in order to collect rich information with regard to research question 1; asking the groups to list the tasks carried out by individuals involved in KT activities. In addition, participants were also invited to state the degree of experience they felt was required for conducting each of the listed tasks.

Behaviours/competencies
The second part of the session focused on behavioural aspects of KT work. As mentioned in the literature review, there are some generic competency frameworks available that lend themselves to the development of new models. The Big Eight model by SHL was chosen as the framework for this section of the study. As in most competency models, the Big Eight competency domains are broken down into competency dimensions and components representing behavioural indicators. Using this structure, it was decided to collect behavioural indicators and to link them back to the Big Eight model to deduce the competencies required for an academic's successful engagement in KT. In this respect, using a modification of the Critical Incident Technique (Flanagan,1954) participants were asked to recall successful KT projects they had been involved in and to describe them in detail to the group. After the example had been given, the facilitator drew the narrator's focus to the behaviours that the individual in the described example had displayed and that had contributed to the success of the project. At this point, the other members of the group were also invited to contribute their opinions or references to similar experiences to the discussion. At the end, the participant who had shared the example with the group was asked to list the three most important behaviours that made their example a success. This procedure was repeated until each participant had provided at least 2 examples. After this, the focus was shifted to unsuccessful KT projects to establish negative behavioural indicators. Individuals were asked to describe unsuccessful KT projects and the behaviours the person involved had displayed that contributed to the project being unsuccessful. As for the successful KT examples, the other members of the group were also asked to contribute their ideas and experiences.

Barriers
The last part of the session focused on barriers that would impede on an academic's engagement in KT activities using an open brain-storming approach. Participants were asked to name and describe barriers that they had experienced and/or would expect to impede on an academic's involvement in KT.

2.12 *Analyses and Results*
The notes taken during the focus groups and the recorded information formed the basis of the analysis.

Tasks/activities
Lists of the tasks mentioned by the different groups of participants were collated combining repetitions. Overall, 17 distinctive tasks such as consultancy, applied research and coaching/mentoring were mentioned (see Table 3). There was a general agreement that to successfully carry out certain tasks, different levels of experience in KT would be required. However, responses from the different groups were ambiguous therefore it was decided to collect more specific information in the next stage

Table 3. Tasks/activities collated through focus groups

	Task/activity
1	Consultancy
2	Applied Research
3	Knowledge Transfer Partnerships (KTPrtn)
4	Mentoring/Coaching
5	Training (short courses, executive programs, workshops,seminars)
6	Presentations/Conference papers
7	Patent/Licence/Spin out activities
8	Expert Witness or advisor
9	Supervision of student work placements
10	Secondment/Business placement
11	Testing materials/equipment
12	Authoring practitioner/applied research books/journal articles
13	CASE awards
14	Exhibitions/commissions
15	Supervision of sponsored PG degrees
16	Event hosting
17	Regeneration projects

Behaviours/competencies
The behaviours that participants had experienced to contribute to the successful and/or unsuccessful running of KT projects were extracted from the materials. They were then categorised into the Big Eight competency model using the 112 competency components as headings for allocation. The full list of behaviours extracted is available on request.

Barriers
Similar to the tasks and activities, the barriers described by participants were collated combining repetitions. This resulted in a list of 40 barriers (see Table 4). Analysis of the barriers showed that they evolved around two different aspects. 19 barriers were found to be related to the academic institution/department e.g. unclear institutional/departmental KT processes, lack of institutional track record of industry/commercial experience, lack of reward/incentives for department etc. 21 barriers focused on the individual academic involving items such as lack of academic's time to engage in KT, academic reluctance to give expertise away, academic's risk aversion etc.

2.2 Survey study

2.21 *Construction of online survey*

Based on the information gathered in the focus group stage of the project, an online survey was developed including qualitative and quantitative elements. The online survey was divided into different sections, in conformance with the different stages of the focus group sessions.

Demographics
Demographic information was collected on the job role of participants to establish their level of involvement in KT activities and on the higher education institution they worked for.

Tasks/activities
In the main part of the survey individuals were presented with a list of tasks and activities carried out under the KT umbrella as reported by participants in the focus groups. Respondents were asked to rate the tasks with regard to the extent to which in their experience they would be carried out by academics on a five-point Likert scale (1=very often to 5=very rarely). Participants were also asked to judge the level of experience required to successfully carry out each task using a three-point scale (1=little, 2=some, 3=a lot of KT experience). At the end of the section participants were given the opportunity to list any further tasks and activities they felt an academic might carry out when involved in KT.

Table 4. Barriers collated through focus groups

	Academic
1	Mis-match in client needs and academic expertise
2	Mis-match of academic and commercial time-scales
3	Flexibility in approach to project required by client
4	Academics personal preference for UG/PG teaching/pure research vs. KT
5	Lack of academic's motivation to engage in KT
6	Lack of academic's time to engage in KT
7	Academic's time available to pursue KT is too fragmented
8	Lack of reward/incentives for academic
9	Academic's lack of confidence-fear of unknown
10	Lack of availability of mentor support for academic
11	Lack of KT training/development opportunities for academic
12	Peer group pressure on academic to 'not engage'
13	Academic's risk aversion
14	Academic's lack of control of funded research agendas
15	Compromises academic's professionalism in other areas (e.g. teaching & research)
16	Lack of academic's track record of industry/commercial experience
17	Lack of academic's reputation in specialist area
18	Academic reluctance to give expertise away
19	Equity - why should I if X doesn't?
20	Academic contract does not include KT
21	Engaging in KT has a negative impact on an academic's career

	Institutional/Departmental
1	Unclear institutional / departmental KT processes
2	Non-standardised processes for KT across institution
3	Lack of communication about KT opportunities available
4	Limited KT opportunities to certain disciplines
5	Bureaucracy (form-filling) required to engage in KT processes
6	Lack of flexibility in pricing structures
7	Lack of investment in up-to-date equipment
8	Lack of investment in core academic/research KT staffing (i.e. mostly project-based)
9	Difficulty in finding replacements for academics 'bought-out'
10	Lack of institutional track record of industry/commercial experience
11	Lack of institutional reputation in specialist area
12	Differing strategic priorities for KT at different levels in the institution
13	KT perceived as less 'academic' and hence of less value than teaching or research
14	Non-commercial culture of Universities
15	Lack of encouragement to pursue KT at Department level
16	Lack of encouragement to pursue KT at Institutional level
17	Lack of reward/incentives for Department
18	Institutional risk aversion
19	Departmental risk aversion

Behaviours/competencies
A qualitative approach with open questions was used to explore behaviours critical for successful/unsuccessful running of KT projects. Similar to the procedure in the focus groups, participants were prompted to recall successful KT projects and then asked to list the behaviours that the individuals involved in the example had displayed and that made the project a success. This was repeated for unsuccessful KT projects.

Barriers
In the last section of the survey, participants were invited to rate the barriers compiled in the focus group sessions to the extent to which they felt they would impede on an academic's engagement in KT. Again, a five-point Likert scale ranging from 1=to a very little extent to 5=to a very great extent was used. In addition, participants were provided

with an opportunity to add additional barriers that they felt were important and not listed in the survey.

2.22 *Participants and procedure*

The survey was carried out between April and May 2006. Emails inviting individuals to participate in the study were sent out directly to 68 individuals. 49 of these were individuals who in the first correspondence had indicated that a preference for this form of involvement and 19 were participants from the focus group stage. Individuals were given a 3-week deadline for completion of the survey. In addition, the institutional third-stream regional representatives were contacted, asking them to promote the project and to encourage participation.

After the final deadline, a total of 60 responses had been received. To satisfy concerns about confidentiality, responses to the survey were electronically anonymised before being received, ensuring that results were completely anonymous. Individuals from 7 higher education institutions participated in the survey. Half (30) of the respondents were KT professionals, 22 were academics without a dedicated KT role and 8 were academics with a dedicated KT role e.g. Medici or Innovation fellows.

2.23 *Analyses and Results*

Tasks

An analysis of the ratings of the tasks with regard to the extent to which participants thought they would be carried out by academics, was carried out. The mean i.e. response average for each task/activity, was used as indicator. The results of the analysis can be found in Table 5. Task and activities with the smallest mean i.e. top of the list were perceived to be carried out the most. The mean can be interpreted with regard to the scale ranging from 1=tasks/activity carried out very often, 2=often, 3=sometimes, 4=rarely and 5=very rarely. There was a general consensus amongst participants with regard to the ratings of the tasks, i.e. a clear tendency with regard to the extent to which tasks would be carried out with only a few individuals rating the extent differently than the majority. This is reflected in the standard deviations that are similar for all the tasks, always reaching a value of around 1.

The task of giving presentations/conference papers was perceived to be carried out most often followed by applied research and consultancy work. These represent rather general activities. Tasks/activities that participants felt would be carried out only rarely by academics involved in KT, i.e. tasks/activities at the end of the list, are more specific and specialised e.g. expert witness or advisor, regeneration projects or patent/license/spin out activities.

Table 5. Frequency of tasks carried out by academics under KT umbrella

	Mean	Std. Deviation
Presentations/conference papers	2,35	1,158
Applied research	2,42	,942
Consultancy	2,54	,944
Authoring practitioner/applied research books/journal articles	2,65	1,296
Training	2,65	1,082
Supervisor of student work placements	2,79	1,352
Mentoring/coaching	2,88	1,196
supervision of sponsored PG degrees	2,94	1,262
KT Partnership	2,96	1,091
Event hosting	3,29	1,051
Exhibitions/commissions	3,37	1,003
Testing materials/equipment	3,40	1,106
Expert Witness or advisor	3,42	1,048
Regeneration projects	3,73	1,125
Secondments/business placements	3,75	1,120
CASE awards	4,00	1,072
Patent/licence/spin out activities	4,10	,951

With regard to the extent of experience that respondents perceived to be necessary to carry out the tasks listed, an analysis of frequencies was carried out (see Table 6). The response that represents the answer of the majority of respondents is highlighted in bold. It can be seen that to be involved in patent/license and spin out activities a lot of KT experience is perceived to be required. Other tasks such as testing materials and equipment, authoring practitioner/applied research books and journal articles, work on exhibitions and commissions, hosting events and conducting Case Awards only a little KT experience is perceived to be required. Most activities were rated by respondents to require some KT experience. With regard to some activities the responses do not provide a clear pattern. To conduct consultancy work for instance participants felt that some to a lot of KT experience would be required. With respect to the activity of being an expert witness or advisor, answers were more ambiguous. The same number of respondents felt that little, some and a lot of KT experience would be required. This might suggest a different understanding of the task and what it involves.

Table 6. Frequencies of experience perceived to be required to carry out tasks

	Little KT experience	**Some KT experience**	**A lot of KT experience**
Knowledge Transfer Partnerships	8% (4)	**56% (27)**	35% (17)
Presentations/Conference papers	42% (20)	**52% (25)**	6% (3)
Expert Witness or advisor	**33% (16)**	**33% (16)**	**33% (16)**
Supervision of student work placements	42% (20)	**44% (21)**	15% (7)
Testing materials/equipment	**48% (23)**	31% (15)	21% (10)
Consultancy	8% (4)	**46% (22)**	**46% (22)**
Authoring practitioner/applied research books/journal articles	**52% (25)**	31% (15)	17% (8)
Exhibitions/Commissions	**48% (23)**	46% (22)	6% (3)
Applied Research	27% (13)	**58% (28)**	15% (7)
Mentoring/Coaching	15% (7)	**50% (24)**	35% (17)
Event hosting	**44% (21)**	40% (19)	17% (8)
Regeneration projects	27% (13)	**52% (25)**	21% (10)
Supervision of sponsored PG degrees	33% (16)	**46% (22)**	21% (10)
Secondment/Business placement	27% (13)	**40% (19)**	33% (16)
Patent/Licence/Spin out activities	23% (11)	31% (15)	**46% (22)**
Training (short courses, executive programmes, workshop, seminars)	23% (11)	**63% (30)**	15% (7)
CASE awards	**42% (20)**	31% (15)	27% (13)

Statistical analyses explored differences between the three groups on their ratings and showed that academics without a dedicated KT role felt that training would be conducted more often compared to KT professionals.

Behaviours/Competencies
Participants' statements with regard to the behaviours were extracted from the survey and categorised by two independent raters into the SHL Big 8 competency framework using the 112 competency components as basis. Differences in classifications between the two judges were discussed with a third rater and behaviours were subsequently categorised into the competency that was deemed most appropriate. After this, the behaviours collected in the focus groups were added to the framework, this gave a total of 263 behaviours. At this point, the behaviours in each competency dimension were counted to establish which dimension appeared most important for an academic to be successfully engaged in KT. Overall importance of a competency dimension was assessed by sub-summing the numbers of positive and negative statements for each dimension. The competency dimension that was mentioned the most was deemed to be of most importance. In addition, the competency dimensions were also rank ordered with regard to the number of positive statements associated with them. Table 7 shows the ratings of the competency dimensions. Competency dimensions were then combined to give summary totals of behaviours by competency (Table 8). Subsequently, all redundancies and duplicates were removed and the negative behaviours were rephrased into positive behaviours giving a final list of 186 behaviours by competency domain and dimension (see Appendix. Table A).

'Presenting and communicating information' showed to be the most important competency. Behaviours related to this competency were mentioned 31 times in total. Furthermore, this competency also holds rank number one with regard to the number of positive behaviours (27) related to it. The competency in second place for both rankings is 'relating and networking'. Both these competency dimensions relate to the competency domain of 'interacting and presenting'. They are followed by 'delivering results and meeting customer expectations', a competency dimension related to 'organising and executing'. The full list of competencies in order of importance with examples of behavioural indicators is shown in Table 9. 'Creating and conceptualising' as well as 'leading and supporting' appear to be the competency domains of least importance to an academics successful engagement in KT with only a few behavioural indicators mentioned for each of them.

The recent research of Bartram (2005) has shown evidence for specific personality and ability predictors of the Great Eight competencies (see Table 1). Applying these findings to this context and taking the top 7 competencies it is likely that general mental ability, extraversion, conscientiousness and need for achievement might be key predictors of academics KT competencies (see Table 9). Those academics for whom these characteristics come naturally may find it easier to demonstrate the required KT competencies. This is important information that could be used in selection and development. Collating this information to the competency level (Table 8) it would appear that the most important predictors are general mental ability, extraversion and conscientiousness.

Table 7. Ratings of competency dimensions from survey and focus groups

Competency dimension	**No. positive behaviours**	**No. negative behaviours**	**Total**	**Rank order total**	**Rank order positive behaviours**
3.3 Presenting and Communicating Information	27	4	31	1	1
3.1 Relating & Networking	27	3	30	2	1
6.2 Delivering Results and Meeting Customer Expectations	24	4	28	3	3
8.2 Entrepreneurial & Commercial Thinking	19	2	21	4	4
6.1 Planning & Organising	12	8	20	5	9
2.1 Working with People	16	3	19	6	5
3.2 Persuading & Influencing	15	4	19	6	6
4.2 Applying Expertise & Technology	13	1	14	8	8
7.1 Adapting & Responding to Change	14	0	14	8	7
4.3 Analyzing	11	3	14	8	10
6.3 Following Instructions and Procedures	11	3	14	8	10
8.1 Achieving Personal Work Goals and Objectives	11	0	11	12	10
5.1. Learning & Researching	6	0	6	13	13
1.2 Leading and Supervising	6	0	6	13	13
2.2 Adhering to Principles and Values	2	3	5	15	17
7.2 Coping with Pressures & Setbacks	4	0	4	16	15
4.1 Writing & Reporting	3	1	4	16	16
5.2 Creating & Innovating	2	0	2	18	17
5.3 Formulating Strategies & Concepts	1	0	1	19	19
Total			263		

Table 8. Summary of behaviours by competency and their predictors

	Competency Domain	**No. Behaviours**	**Predictors**
3	Interacting and presenting	80	Extraversion, general mental ability
6	Organising and Executing	62	Conscientiousness, general mental ability
8	Enterprising and performing	32	Need for achievement, negative agreeableness
4	Analysing and Interpreting	32	General mental ability, openness to new experience
2	Supporting and Cooperating	24	Agreeableness
7	Adapting and coping	18	Emotional stability
5	Creating and conceptualizing	9	Openness to new experience, general mental ability
1	Leading and Deciding	6	Need for power and control Extraversion

Barriers

Respondents rated the extent to which they felt the barriers listed would impede on academics' involvement in KT activities from 1=to a very little extent, 2=to a little extent, 3=to a moderate extent, 4=to a great extent to 5=to a very great extent. Therefore, the higher the mean score the more of a negative impact the barrier is thought to have on an academics engagement in KT. As for the ratings of the tasks, the ratings of the barriers showed to have clear tendencies, i.e. participants rated the extent to which a barrier would impede on an academics involvement in KT similarly with only a few respondents selecting answers that differed widely from the majority. The standard deviations of the ratings are similar between the barriers, which indicates that the extent to which responses are spread are similar.

Table 9. Rank order list of competencies and example behavioural indicators

Rank	Competency domain	Competency dimension	Examples of behavioural indicators
1	Interacting and presenting	3.3 Presenting and Communicating Information	- Put information across concisely and easily accessible for client - Relate to audience and adapt to their needs
2	Interacting and presenting	3.1 Relating & Networking	- Build rapport through regular contact with client - Network with other academics who are involved in KT work
3	Organising and executing	6.2 Delivering Results and Meeting Customer Expectations	- Establish client's needs through probing and confirm them in writing - Manage expectations on both sides
4	Enterprising and performing	8.2 Entrepreneurial & Commercial Thinking	- Stay in touch with latest development within the industry - Identify and develop technology ahead of the market and industry demand
5	Organising and executing	6.1 Planning & Organising	- Clarify outputs/deliverables - Provide clear timetable
6	Supporting and co-operating	2.1 Working with People	- Acknowledge expertise of other parties involved - Listen to advice
6	Interacting and presenting	3.2 Persuading & Influencing	- Demonstrate and sell benefits of certain actions - Ensure buy-in from stakeholders from an early stage
8	Analysing and interpreting	4.2 Applying Expertise & Technology	- Provide detailed subject-specific knowledge - Apply theory to practice
8	Adapting and coping	7.1 Adapting & Responding to Change	- Conduct change management through regular reviews - Be open to different ideas
8	Analysing and interpreting	4.3 Analyzing	- Evaluate different options for client - Provide recommendations that are firmly rooted in available evidence
8	Organising and executing	6.3 Following Instructions and Procedures	- Meet deadlines - Be committed and available
12	Enterprising and performing	8.1 Achieving Personal Work Goals and Objectives	- Be enthusiastic - Demonstrate drive towards goals
13	Creating and conceptualising	5.1. Learning & Researching	- Learn from previous mistakes in industry collaborations - Challenge and ask a lot of questions
13	Leading and deciding	1.2 Leading and Supervising	- Coach and mentor associates - Motivate others
15	Supporting and co-operating	2.2 Adhering to Principles and Values	- Be open and honest about uncertainties - Only agree to something that can be done
16	Adapting and coping	7.2 Coping with Pressures & Setbacks	- Be confident to leave comfort zone - Be positive
16	Analysing and interpreting	4.1 Writing & Reporting	- Write product reports according to clients requirements and understanding
18	Creating and conceptualising	5.2 Creating & Innovating	- Be creative and think outside the box
19	Creating and conceptualising	5.3 Formulating Strategies & Concepts	- Manage academic-related issues

Table 10. Inferred predictors of most important academic KT competencies

		Competency Domain	**Competency Dimension**	**Predictors**
1	3	Interacting and presenting	3.3 Presenting and Communicating Information	Extraversion, general mental ability
2	3	Interacting and presenting	3.1 Relating & Networking	Extraversion, general mental ability
3	6	Organising and executing	6.2 Delivering Results and Meeting Customer Expectations	Conscientiousness, general mental ability
4	8	Enterprising and performing	8.2 Entrepreneurial & Commercial Thinking	Need for achievement, negative agreeableness
5	6	Organising and executing	6.1 Planning & Organising	Conscientiousness, general mental ability
6	2	Supporting and co-operating	2.1 Working with People	Agreeableness
7	3	Interacting and presenting	3.2 Persuading & Influencing	Extraversion, general mental ability

These competency titles are taken from the SHL Universal Competency Framework ™ Profiler and Designer cards (copyright © 2004 by SHL Group plc).

Looking at the barriers related to academic departments/institutions (Table 11), lack of reward/incentives for departments to engage in KT was judged to be the most impeding. While this barrier relates to the departmental level, it is closely followed by issues on an institutional level, e.g. issues related to staffing, bureaucracy, replacements, communication, and institutional risk aversion. However, the variance between the mean scores for the different barriers is small, which suggests that they are of relative similar importance.

Table 11. Institutional barriers impeding on academics' engagement in KT activities

	Mean	**S.D.**
Lack of reward/incentives for Department	3.63	1.213
Lack of investment in core academic/research KT staffing (i.e. mostly project-based)	3.58	1.217
Bureaucracy (form-filling) required to engage in KT processes	3.53	1.062
Difficulty in finding replacements for academics "bought-out"	3.40	1.236
Limited KT opportunities to certain disciplines	3.35	.975
Lack of communication about KT opportunities available	3.35	1.167
Non-commercial culture of Universities	3.28	1.301
Differing strategic priorities for KT at different levels in the institution	3.25	1.127
Institutional risk aversion	3.13	1.265
Unclear institutional/departmental KT processes	3.13	1.181
Lack of flexibility in pricing structure	3.10	1.194
Lack of encouragement to pursue KT at Department level	3.05	1.239
Lack of institutional track record of industry/commercial experience	3.05	1.197
Departmental risk aversion	3.00	1.198
Lack of institutional reputation in specialist area	2.95	1.176
Non-standardised processes for KT across institution	2.88	1.244
Lack of investment in up-to-date equipment	2.73	1.176
KT perceived as less "academic" and hence of less value than teaching or research	2.70	1.324
Lack of encouragement to pursue KT at Institutional level	2.68	1.347

With regard to barriers related to the individual academic (Table 12), analysis showed that time issues were perceived to impede most on academics' engagement in KT. An academic's time available to pursue KT was perceived too fragmented and too little and participants also felt that a mis-match of academic and commercial time-scales would cause difficulties. Apart from this the lack of rewards/incentives for academics was also seen to have a rather strong negative impact on their engagement in KT.

Table 12. Individual barriers impeding on academics' engagement in KT activities

	Mean	**S.D.**
Academic's time available to pursue KT is too fragmented	4.05	.876
Lack of academic's time to engage in KT	3.90	1.008
Lack of reward/incentives for academic	3.83	1.130
Mis-match of academic and commercial time-scales	3.78	1.000
Academic's lack of control of funded research agenda	3.35	1.075
Lack of academic's motivation to engage in KT	3.33	1.185
Academics personal preferences for UG/PG teaching/pure research vs. KT	3.33	1.118
Lack of academic's track record of industry/commercial experience	3.20	1.265
Flexibility in approach to project required by client	3.10	1.008
Mis-match in client needs and academic expertise	3.05	.904
Academic's lack of confidence - fear of unknown	3.00	1.086
Compromises academic's professionalism in other areas (e.g. teaching & research)	2.98	1.330
Lack of academic's reputation in specialist area	2.93	1.141
Academic's risk aversion	2.90	1.081
Lack of availability of mentor support for academic	2.88	1.090
Academic contract does not include KT	2.83	1.394
Equity - Why should I if X doesn't?	2.78	1.230
Academic reluctance to give expertise away	2.78	1.097
Peer group pressure on academic to "not engage"	2.20	1.203
Engaging in KT has a negative impact on an academic's career	2.20	1.265

Statistically significant differences between the three group of participants were found with regard to their ratings of the following barriers: lack of investment in up-to-date equipment, KT perceived as less "academic" and hence of less value than teaching or research, academics personal preferences for UG/PG teaching/pure research, lack of academic's motivation to engage in KT and Academic's risk aversion.

Academics without a dedicated KT role felt that the lack of investment in up-to-date equipment would impede more on an academics engagement in KT than academics with a dedicated KT role. Furthermore, academics with a dedicated KT role judged an academic's risk aversion to impede higher on their engagement in KT activities than academics working on a normal academic contract. KT professionals rated the importance of the lack of an academic's motivation to engage in KT significantly higher than Academics with a dedicated KT role. The barriers that KT was perceived as less "academic" and hence of less value than teaching or research and the academics personal preference for UG/PG teaching/pure research vs. KT were perceived to impede stronger on an academics engagement in KT by KT professionals than by academics without a dedicated KT role.

Statistically significant differences were found between the different academic institutions with regard to the extent to which they believe the following barriers impede on an academics engagement in KT: lack of institutional reputation in specialist area, mis-match in client needs and academic expertise, mis-match of academic and commercial time-scales, lack of availability of mentor support for academic and unclear institutional/departmental KT processes.

3. Discussion

3.1 Tasks, Competences, Barriers

Tasks

The list of tasks derived from the study provides some clarification of what is perceived to fall under the heading of third-stream activities. The top 5 tasks cited were: giving presentations/conference papers, applied research, authoring practitioner/applied research books/journal articles and training. The tasks/activities that participants judged would be carried out only rarely by academics were secondments/business placements, CASE awards and patent/licence/spin out activities. It is important to note that there was little variation in the views of the participants in this respect. There was good consensus on the degree of KT experience required to complete a number of these tasks. Typically, little experience is required for testing and authoring whilst much experience is required for patents, licences and spin-outs and some for Knowledge Transfer partnerships (KTPrtns), applied research, mentoring/coaching, regeneration projects and training. There was less consensus about the level of experience required to complete the other tasks. This may reflect the real variety that exists in the level at which these tasks are carried out or it may reflect the participants lack of true knowledge about the tasks and hence their ability to rate them accurately. This study therefore supports the findings within the case studies cited previously, that activities might include: commercialising research, managing and delivering Knowledge Transfer Partnership programmes, consultancy, delivering short courses and presenting at external events. In general, the results regarding the task/activities provide a valuable insight into *what* HEI employees perceive an academic is likely to be required to do when getting involved in KT and in addition, indicates the level of experience that they may require in order to complete this.

This information is of use in developing both job and role profiles involving KT at different levels and in setting performance targets/objectives.

Several of the tasks mentioned to be carried out most often by academics involved in KT e.g. giving presentations/conference papers or authoring practitioner/applied research book/journal articles could be subsumed under the traditional 'academic' job role and the functions it is generally seen to comprise, i.e. teaching and learning, and research and scholarship. However, the focus changes slightly when considering these tasks in a KT context. Here the application of these activities to a practical context is most important, i.e. the emphasis is not so much on just authoring books but authoring practitioner or applied research books. However, the similarity of the tasks and therefore the general familiarity with them should make it easier for an academic to transfer their competencies and carry these tasks out in a KT context. In this respect these tasks may serve as a useful starting point for engagement in KT for many academics.

Competencies
The study identified 263 behaviours from the focus groups. These behaviours were categorized according to the Great Eight framework, and a rank order list of competencies in order of importance was generated on the basis of numbers of behaviours identified in each competency.

Some of the competency domains appear to be of greater importance to an academic's successful engagement in KT than others. 'Interacting and presenting' appears to be most important representing the two most frequently mentioned competency dimensions 'presenting and communicating information' and 'relating and networking' that received the highest number of behavioural indicators. 'Organising and executing' also appears to be of rather great importance. This competency domain is represented by three competency dimensions: 'delivering results and meeting customer expectations', 'planning and organising' and 'following instructions and procedures'.

'Leading and deciding' was only mentioned a few times and is represented only by one competency dimension, 'leading and supervising', suggesting less importance of this domain with regard to KT. Similarly, 'creating and conceptualising'; three competency dimensions related to this domain were referred to by participants ('learning and researching', 'creating and innovating' and 'formulating strategies & concepts'). However, the dimensions only received a small number of behavioural statements indicating that they are of less importance than the other competency dimensions.

After removal of duplicate behaviours 186 behaviours remained. For each competency key example behaviours were identified e.g. (1) Presenting and Communicating Information (e.g. put information across concisely and easily accessible for client), (2) Relating & Networking (e.g. build rapport through regular contact with client), (3) Delivering Results and Meeting Customer Expectations (e.g. establish client's needs through probing and confirm them in writing), (4) Entrepreneurial & Commercial Thinking (e.g. stay in touch with latest development within the industry), (5) Planning & Organising (e.g. provide clear timetable), (6) Working with People (e.g. listen to advice),

(7) Persuading & Influencing (e.g. demonstrate and sell benefits of certain actions), (8) Enterprising and performing (e.g. identify and develop technology ahead of the market and industry demand).

Based on the work of Bartram (2005) it is suggested likely that general mental ability, extraversion, conscientiousness and need for achievement might be key predictors in academics of these key KT competencies. Those academics for whom these characteristics come naturally may find it easier to demonstrate the required KT competencies.

To the authors' knowledge this is the first work that has explored the competencies that academics require to engage in KT. The review of work carried out in a KS and KT Professional context suggests much overlap. Typically, the KS literature suggests communication, listening skills, credibility (trust and reputation), accessibility, organisation and expertise are all essential components of the competency/skill set. Each of these are identified in this study as key aspects of the competencies required by academics when engaging in KT : Presenting and communicating information – Academic Rank 1, Relating and networking - Rank 2, Planning and organising - Rank 5, Applying expertise and technology- Rank 8 and Adhering to principles and values - Rank 15.

However, the work in each of these other two contexts has not considered *relative* importance of each of the competencies and hence it is difficult to make any really meaningful direct comparisons. Typically, it may well be that there is a general KT competency set applicable across each KT context (KT Professionals, academics and KS within organisations) but certain competencies may be more important in one context than another. The message is clear; the focus at present should be on developing these two key competencies in academics engaged in KT.

It is also important to relate the findings of this study to the issues raised in the introduction with respect to alignment with current HR processes in the HE sector. It was shown how at a national level little consideration has yet been given to KT in respect of tasks/activities within national academic role profiles and how where they are included it is relatively inconsistently. This omission of KT tasks from role profiles will have an impact on setting objectives and performance management, although from the case studies cited earlier it appears that a number of HEIs have now begun to include them. The related, but different, issue of whether KT requires academics to use different competencies to those required for the identified tasks of teaching and research and scholarship is perhaps of more importance. This includes the question of whether the HERA competency framework is able to accommodate the identified KT competencies. Table 13 maps the academic KT competencies identified in this study on to both the HERA competency framework and the AURIL list of suggested KT Professional skills.

Each of the competency dimensions can be loosely mapped against one of the HERA competencies, notably this has included each of the 4 new HERA competencies added recently (leadership, tenacity, change focus and influencing skills and impact). However,

a few of the competency elements in HERA do not describe competencies as such but behaviours, i.e. the quality of definition is different, which might result in some difficulties of mapping the dimensions onto the HERA competency elements. Some broadening of the HERA definitions is ideally needed to fully accommodate the KT competencies as identified here. Each of the AURIL survey skills (2006) were also mapped against the academic KT competencies identified in this study.

The HERA framework has generic competency headings and context free behavioural descriptions. It can therefore be applied in any situation. The AURIL skills are cited within the AURIL Competency framework which has functional role/task headings such as 'Manage information and communication', a list of generic skills to be applied to this task from the skills list above and specific contextual behavioural indicators. Thus, whilst the generic skills are appropriate to academics in KT (see Table 13 above), the role/task headings and the specific contextual behavioural indicators are not (in the majority of instances). So, whilst the competency set may be the same (i) the rank order of importance of each competency and (ii) the specific behavioural indicators may be different.

This view is partially supported by the results of the AURIL CPD Questionnaire Survey in 2005 which showed that relationship management was rated by KT Professionals as the least popular training topic area, topics such as commercialization and IP were most popular. This same conclusion may apply to the issue of whether the competencies required for academics to engage in KT are the same as for teaching, research and scholarship. The competency set may be the same but (i) the rank order of importance of each competency and (ii) the specific behavioural indicators may be different. This view is supported by the fact that the HERA framework does appear to accommodate at the competency descriptor level the KT competencies. As noted however, the definitions under these headings do need some broadening to fully encompass KT.

The extent to which the current KT CPD training/development frameworks and materials available (provided by the Research Councils, organisations such as AURIL and Praxis and private providers) is appropriate for academics, needs now to be determined. It may be that specific programs for academics need to be designed to be contextualized around the most important competencies/behaviours identified in this study. The level of contextual detail provided by the behavioural indicators in this study is important information that could be used in this process together with more generally in academic job design, selection, training and development, career planning and development and succession planning.

Table 13. Mapping of competencies/skills between current study, HERA framework and AURIL skills.

Rank	**Competency dimension**	**HERA**	**AURIL Skills Survey 2006**
1	3.3 Presenting and Communicating Information	Communications	- Communication skills - Facilitation skills - Oral presentation skills
2	3.1 Relating & Networking	Liaison and networking	- Public relation skills
3	6.2 Delivering Results and Meeting Customer Expectations	Service delivery	
4	8.2 Entrepreneurial & Commercial Thinking	Initiative and problem-solving	- Financial awareness and ability to use financial data and indicators - Marketing skills and marketing awareness - Business planning skills - Skills concerned with enhancing commercial insights - Entrepreneurial skills
5	6.1 Planning & Organising	Planning and organizing resources	
6	2.1 Working with People	Teamwork and motivation	
6	3.2 Persuading & Influencing	Influencing skills and impact	- Negotiating skills - Selling skills
8	4.2 Applying Expertise & Technology	Knowledge and experience	
8	7.1 Adapting & Responding to Change	Change Focus	
8	4.3 Analyzing	Analysis and research	
8	6.3 Following Instructions and Procedures	Planning and organizing resources	- Administrative skills - Project management skills - Time management skills
12	8.1 Achieving Personal Work Goals and Objectives	Initiative and problem-solving	
13	5.1. Learning & Researching	Analysis and research	
13	1.2 Leading and Supervising	Leadership	- Leadership skills
15	2.2 Adhering to Principles and Values	Service delivery	- Skills and awareness of related legislation
16	7.2 Coping with Pressures & Setbacks	Tenacity	
16	4.1 Writing & Reporting	Communication	
18	5.2 Creating & Innovating	Initiative and problem-solving	
19	5.3 Formulating Strategies & Concepts	Initiative and problem-solving	- Conceptualization skills

Barriers
A total of 19 institutional and 20 individual barriers were identified ranging from rewards and incentives through to risk aversion. These findings support the suggestions made by Jacobson et.al. (2005) with respect to reward and incentives as a barrier in academia. They also concur with the barriers shown by Yih-Tong and Scott (2005) to be important in a KS context, namely; reward and incentives, supporting infrastructure, communication, divergent objectives, limiting culture, fear of inadequacy and fear of loss of ownership.

The top 3 institutional barriers were: lack of reward/incentives for department, lack of investment in core academic/research KT staffing (i.e. mostly project-based), bureaucracy (form-filling) required to engage in KT processes. The top 4 individual barriers were: academic's time available to pursue KT is too fragmented, lack of academic's time to engage in KT, lack of reward/incentives for academic, mis-match of academic and commercial time-scales.

Interestingly, lack of reward/incentives appears in the top 3 at both the institutional and individual level. Whilst it has generally been acknowledged for some time that reward at an individual level is important, this study shows that it is also important at department level. Departments know the rewards of bringing in more students and research funding, but what are they for KT? Often there is even no re-investment in KT departmental resourcing leading to the second top institutional barrier: The lack of investment in core KT staffing. This has its effect on inability to be proactive, to respond to leads and role overload on those who are ‘left to pick up the pieces’. With few rewards/incentives, little investment in KT core staffing, bureaucratic form-filling then often becomes the ‘final straw’.

Of most interest is the finding that at the individual level, 3 of the top 4 barriers relate to time. Most importantly, it is not lack of time per se that is the biggest barrier, but lack of suitable blocks of time in which to carry out the work. This might suggest that expecting academics to engage in all three activities of teaching, research and KT is simply too much. The degree of multi-tasking or polychronicity that this requires is problematic when one considers the complex and often conceptual nature of the tasks involved. A study by Frei, Racicot & Travagline (cited in Francis-Smythe, 2006) showed that whilst academic faculty members’ involvement in multiple projects gave the impression they were polychronic, they had a preference for monochronicity. Requiring polychronic behaviour from people with monochronic tendencies is likely to result in either or both poorer performance and psychological well-being. Lack of time itself is still perceived as a major barrier. This was also cited by King (2004) as the principle barrier to academics engaging in CPD. If we then identify academics need additional training /CPD to engage in KT, time will become even more of a limiting factor. Interestingly, in a survey by AURIL (2005) of KT Professionals time was not a major limiting issue to their engagement in CPD. The mis-match of time scales barrier may be due to the fact that clients working with commercial experts are able to expect the expert to dedicate

themselves totally to a project once it has started whereas with most academics KT projects are run alongside their 'normal' job and as such have to take place over an extended period of time. It must be acknowledged however, that this mis-match was also perceived by participants as a lack of a sense of urgency or a need for adherence to deadlines by academics.

The results also demonstrate that there are significant differences especially between KT professionals and academics with regard to the perception of the importance of certain barriers. KT professionals appear to perceive academics 'lack of motivation to engage in KT activities', 'their personal preference for UG/PG teaching/pure research' as well as the fact that KT was perceived as 'of less value than teaching and research' to impede stronger on academics' engagement in KT activities than academics themselves. However, slight differences also became apparent between academics with and academics without dedicated KT roles. Compared to academics with a dedicated KT role, academics without a dedicated KT role felt that the lack of investment in up-to-date equipment would impede more on their engagement in KT. At the same time, they felt that their risk aversion was less of a barrier to engagement in KT activities than it was perceived by academics with a dedicated KT role.

This information is important since it suggests that different groups involved in KT activities perceive different barriers to be of importance. Especially with regard to the work of academics, the results could indicate that there might be barriers that they do not actively perceive but that impede on their engagement in KT activities. Addressing these barriers proactively might help to get academics more actively engaged in KT activities. For instance, a general assessment of academics' risk aversion and how it can be overcome might increase the extent to which they get involved in KT projects. The question of incentives for academics to engage in KT is an issue that needs addressing. To emphasise the value of an engagement in KT and to create and clearly outline incentives connected with it, might increase academics motivation to engage in KT activities. Knowledge of the barriers that impede on academics engagement in KT should make it possible to actively address them, which in turn should help to support the process of getting academics more actively involved in KT. The results of this study suggest that this needs to be addressed on two levels. On one side there are issues that might most effectively be looked into on an institutional level such as providing encouragement for academics to get involved in KT and attach value to it. On the other side there are issues related to the individual academic. While some of them might require intervention on an individual level, e.g. an academic's reluctance to give away expertise, others could possibly be better influenced through an intervention on an institutional level and a shift in culture, e.g. the perceived fact that engagement in KT has a negative impact on an academic's career.

Differences in perceived barriers between universities were noted, typically, for some lack of reputation, for others mismatch client/academic needs, lack of mentors, mismatch academic and client timescales and unclear KT processes were more important. However these results should be interpreted with caution given the very small sample size in many instances.

3.2 Limitations of Study

Despite efforts to maximize engagement the level of participation in both the focus groups and the survey were relatively small (29, 60 resp. Total=89), although comparable to the national research carried out by AURIL (2006) with KT Professionals to update the CPD framework (total =94). Of the 155 people who initially agreed to have their names put forward by their institutional representative for this study 39% responded to the specific invite by the researchers to participate, of these, 57% were KT Professionals. Thirty-three per cent (33%) of the KT Professionals and 16% of the academics took part in a focus group, 67% KT Professionals and 84% academics in the survey. The survey was completed by 50% academics and 50% KT Professionals across 7 institutions (although 68% were from 2 'new' universities). There was then in general a reluctance to engage in this project, most specifically with the focus groups and most particularly with academics. These results are hardly surprising given the findings of this study: that lack of time is a significant barrier to academic engagement in KT or CPD activity.

The fact that there was an equal split in KT Professionals and academics in the survey suggests findings should be representative across roles. It was interesting to note that in terms of both tasks and barriers there was a relatively good consensus on ratings across participants suggesting a good degree of commonality in perceptions around these issues.

The methodology employed in this study to determine rank ordering of competencies was by counting the number of times identical behaviours were cited. It might be argued that frequency of report does not determine importance, however, in this instance where participants were encouraged to state the behaviours that they witnessed it is deemed to be a suitable measure.

3.3 Other

This study has built on previous work reported in the KT and KS literature and demonstrated how findings in one context can be applicable in another; this was perhaps best supported by the work relating to competencies and barriers. The study provides much information to help progress the suggestions made by the BITS Review in terms of providing some background information on HE policy and academic culture to enhance and contextualize the training and development of KT Professionals. In addition, it also begins to address the concern expressed in the BITS Review around the need for broader training of people involved in KE other than KT Professionals.

Examples from the case studies cited in the introduction show that selected HEIs are addressing some, if not many, of the issues raised in this report. Sunderland University appears exemplary in this respect, having developed an infrastructure to better support, promote, develop, recognize and reward KE activity. York are currently developing a similarly integrated approach. Others have addressed the 'time' issue by focusing on allowing for dedicated KE time by a number of different routes. The extent to which yet more examples/recipes of 'good practice' in this area will come forward in the current good practice programme has yet to be determined, the fact that such a programme is urgently required is certainly supported by the findings of this study.

3.4 Summary

Overall, the results of this study provide valuable information on 'the tasks involved in', 'the competencies required for' and 'the barriers to' academic engagement in KE. If we seek to enhance academic engagement in KE then we need to utilize and embed this information at a national and local level in each of the HR processes of job design, recruitment and selection, performance management, training and development, career and succession planning.

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Appendix

Table A. Summary list of behaviours by competency domain and dimension

Competency	Competency dimension	Competency components	Redefined positive behaviours
1. Leading & Deciding	**1.2 Leading and Supervising**	**1.2.1 Providing Direction and Coordinating Action**	Manage project
			Lead project
		1.2.3 Coaching	Coach and mentor associates
		1.2.6 Motivating Others	Motivate others
		1.2.8 Identifying and Recruiting Talent	Apply and follow effective recruitment procedures
2. Supporting & Co-operating	**2.1 Working with People**	**2.1.1 Understanding Others**	Be able to work with individuals in organisation and respect them
		2.1.2 Adapting to the Team	Work in a team
			Work as part of a team
		2.1.4 Recognising and Rewarding Contribution	Acknowledge expertise of other parties involved
			Appreciate knowledge and expertise of company
		2.1.5 Listening	Listen to client
			Listen to client's requirements and needs
			Listen to advice
		2.1.6 Consulting Others	Involve client in the production process and scoping of the project; work collaboratively

			Understand project brief and engage fully with industry partner
		2.1.7 Communicating Proactively	Be proactive and approach people to discuss issues
			Set up meetings with individuals if necessary
		2.1.8 Showing Tolerance and Consideration	Be patient with client
		2.1.9 Showing Empathy	Emphasise with client's problem
		2.1.10 Supporting Others	
		2.1.11 Caring for Others	
		2.1.12 Developing and Communicating Self-knowledge and Insight	
	2.2 Adhering to Principles and Values	**2.2.1 Upholding Ethics and Values**	Be open and honest about uncertainties
		2.2.2 Acting with Integrity	Only agree to something that can be done
		Other	Ensure all technology/IPR is sufficiently protected
3. Interacting & Presenting	**3.1 Relating & Networking**	**3.1.1 Building Rapport**	Build relationships
			Be sensitive to other people
			Entertain positive relationships with range of individuals e.g. KT associates, senior management of company
			Build rapport through regular contact

			Build trust
			Gain confidence of client
		3.1.2 Networking	Keep ongoing regular contact with client
			Maintain industry contacts and relationships
			Continue dialogue with potential partners
			Maintain close relationships with technology transfer unit to gain advice
			Keep sufficient informal contact
			Establish strong network of people to get things going
			Know whom to talk to for different issues
			Network with other academics who are involved in KT work
			Approach people and network
		3.1.3 Relating across Levels	Know who the key players are
		Other	Translate personal relationships into commercial advantage
	3.2 Persuading & Influencing	**3.2.1 Making an Impact**	Be consultative, not being telling nor controlling
			Be aware of appropriate behaviour
		3.2.3 Appealing to Emotions	Clarify methods of engagement with client from beginning
			Provide sufficient information without being overwhelming
			Engage with client without superior attitude

		3.2.4 Promoting Ideas	Sell and ensure that others see the value of the work
			Put together a case and an appropriate price
			Describe benefits to participating parties
			Demonstrate and sell benefits of certain actions
			Pursue solution in non-threatening, non-patronising way
		3.2.5 Negotiating	Be diplomatic
			Negotiate
			Be hard-faced
		3.2.6 Gaining Agreement	Ensure buy in from key stakeholders from an early stage
			Ensure coherence between academic staff and client
			Agree terms with management
	3.3 Presenting and Communicating Information	**3.3.2 Explaining Concepts and Opinions**	Communicate science in plain English
			Use a common language to ensure understanding
			Explain complex ideas or solutions in a way that client understands
		3.3.3 Articulating Key Points of an Argument	Put information across concisely and easily accessible for client
			Speak and understand the language of the organisation
			Define outcomes precisely

		3.3.4 Presenting and Public Speaking	Tailor information to client's needs
			Present issues and discuss
		3.3.5 Projecting Credibility	Be confident e.g. about the fact that can contribute something to the company
			Be credible in business community
			Be competent
			Be credible
			Look the part
		3.3.6 Responding to an Audience	Deliver training based on real-world experience and examples
			Tailor information to clients' needs
			Relate to audience and adapt to their needs (understand audience)
		Other	Provide regular updates
			Communicate with business partner in clear manner
			Communicate with client to an appropriate extent independently of KT office
			Encourage debate and dialogue
			Compile results and present information in a manner suitable for understanding by diverse group of people
4. Analysing and interpreting	**4.1 Writing & Reporting**	**4.1.2 Writing Clearly and Fluently**	Write consultancy report for client

			Write product reports according to clients requirements and understanding
			Write advice for client according to their needs
		4.1.4 Targeting Communication	Communicate effectively with directors
		Other	
	4.2 Applying Expertise & Technology	**4.2.1 Applying Technical Expertise**	Provide detailed subject specific knowledge
			Apply expert academic knowledge to meet client's needs
			Provide technical skills
			Provide technical expertise in the precise relevant area when needed
			Provide detailed design and cutting edge knowledge
			Have relevant experience
			Know your subject area
		4.2.3 Sharing Expertise	Disseminate information
		Other	Apply theory to practice
			Search for suitable sources of funding
	4.3 Analyzing	**4.3.1 Analyzing and Evaluating Information**	Evaluate different options for client
			Conduct effective initial needs analysis
			Explore issues

		4.3.2 Testing Assumptions and Investigating	Provide work that is grounded
		4.3.3 Producing Solutions	Solve problems
			Provide recommendations that are firmly rooted in available evidence
			Provide solution
			Offer tangible knowledge-based products
			Provide quality response for solutions
			Provide bespoke business solutions
			Proactively provide ideas on how to solve customer's problem
		4.3.4 Making Judgements	Understand challenges that company faces rapidly
		4.3.5 Demonstrating Systems Thinking	Know which systems can be bypassed
5. Creating & Conceptualising	**5.1. Learning & Researching**	**5.1.1 Learning Quickly**	Learn from previous mistakes in industry collaborations
			Challenge and ask a lot of questions
			Be attentive and switched on
			Learn on your feet
		5.1.2 Gathering Information	Build on existing knowledge
			Understand what information is available and access it quickly

	5.2 Creating & Innovating	**5.2.1 Innovating**	Be creative and think outside the box
	5.3 Formulating Strategies & Concepts	**5.3.1 Thinking Broadly**	Manage academic related issues
6. Organising & Executing	**6.1 Planning & Organising**	**6.1.1 Setting Objectives**	Have clear objectives for meetings and strive towards them
			Clarify outputs/deliverables
		6.1.2 Planning	Provide clear timetable
			Provide well-thought out and planned proposal
			Prepare for meetings
			Organise different parts of the project effectively
		6.1.3 Managing Time	Manage time
			Dedicate time
			Set clear and realistic time-frames
			Be available throughout summer
		Other	Organise
	6.2 Delivering Results and Meeting Customer Expectations	**6.2.1 Focussing on Customer Needs and Satisfaction**	Establish client's needs through probing and confirm them in writing

			Tailor technological design process to client's needs
			Manage expectations on both sides
			Understand clients requirements and needs
			Understand client's perspective and show empathy
			Supply commercial products that are wanted
		6.2.2 Setting High Standards for Quality	Deliver what was required
		6.2.3 Monitoring and Maintaining Quality	Follow project up
		6.2.4 Working Systematically	Keep detailed records of interaction and communication with client
			Multi-task
		6.2.5 Maintaining Quality Processes	Give high quality response
		6.2.7 Driving Projects to Results	Deliver quickly and concisely
			Continue to drive the project forward
			Deliver specified targets/ fulfil agreements
			Complete project - close issue

			Be persistent and see project to an end
			Be determined
			Be focused
			Deliver something practical
			Be resilient
		Other	Ensure associates provide quality contribution; build good reputation
	6.3 Following Instructions and Procedures	**6.3.3 Time Keeping and Attending**	Respond in a timely manner
			Stick to time-frames
			Deliver ahead of time-table
			Meet deadlines
			Arrive on time
		6.3.4 Demonstrating Commitment	Be committed and available
			Persevere
7. Adapting & Coping	**7.1 Adapting & Responding to Change**	**7.1.1 Adapting**	Conduct change management through regular reviews
			Be responsive and adapt to suit client needs
			Be flexible
			Adapt to change
			Be flexible to accommodate meetings at short notice
		7.1.2 Accepting New Ideas	Be open to change
			Be open to different ideas
		Other	Be confident to leave comfort zone
	7.2 Coping with Pressures & Setbacks	**7.2.4 Maintaining a Positive Outlook**	Take an optimistic approach

			Be positive
			Believe in yourself
8. Enterprising & Performing	**8.1 Achieving Personal Work Goals and Objectives**	**8.1.1 Achieving Objectives**	Achieve objectives
		8.1.2 Working Energetically and Enthusiastically	Be enthusiastic
			Be motivated and engaged
			Demonstrate drive towards goals
			Be passionate
			Work long hours if necessary
		Other	Know own capabilities and limitations
	8.2 Entrepreneurial & Commercial Thinking	**8.2.1 Monitoring Market and Competitors**	Stay in touch with latest development within the industry and ahead of small industry partners
			Know what is going on in the world outside the university
			Be topical and up-to-date
			Have a good reserve of knowledge of what is new
		8.2.2 Identifying Business Opportunities	Identify and develop technology ahead of the market and industry demand
			Understand gaps in the market/practice
			Recognise potential of projects
		8.2.3 Demonstrating Financial Awareness	
		8.2.4 Controlling Costs	Recognise financial realities

		8.2.5 Keeping Aware of Organisational Issues	Be politically aware
			Be aware of current business practices/levels of technology
			Handle DTI red tape for company
			Understand cultural issues
			Understand the company and its processes and products well
		Other	Be aware of information that is commercially sensitive
			Help business partner to protect own interests
			Think commercially
			Understand business, planning, strategy, finance, marketing