

KNOWLEDGE TRANSFER PARTNERSHIPS

A best practice approach to open innovation

Technology Strategy Board
Driving Innovation



Steering Group:

Dr. Debbie Buckley-Golder
Technology Strategy Board, Head of Knowledge Exchange

David Way
Technology Strategy Board, Director of KT and Special Projects

Mark Glover
Technology Strategy Board, Director of Business Planning

Clare Lindsay
Technology Strategy Board, KTP Programme Manager

Ian Coates
Zoefitg Limited, Design Director

Ryan Maughan
AVID Technology Group Limited, Managing Director

Dr. Douglas Robertson
Newcastle University, Director Research and Enterprise

Tony Mitchell
Consultant to British Council

Dr. Jarmila Davies
Welsh Government

John Hand
EPSRC

This summary report is based on Key Attributes of Successful Knowledge Transfer Partnerships, by Philip Ternouth, Cathy Garner, Laurie Wood and Peter Forbes (August 2012). It was commissioned by the Technology Strategy Board (www.innovateuk.org) and by the Research Councils UK (www.rcuk.ac.uk). More information about the Knowledge Transfer Partnership programme can be found at www.ktponline.org.uk

INTRODUCTION

This study shows how the various players, systems and processes within the Knowledge Transfer Partnership (KTP) programme contribute to the success of individual KTP partnerships and projects.

It combines, for the first time, the background literature on the barriers and opportunities of Knowledge Transfer (KT) and the mechanisms through which the barriers can be overcome and the opportunities taken. It uses a model of the ideal attributes and outcomes of effective KT processes against which to measure the KTP and identify the features that contribute to its success. A range of existing KTP partners were interviewed and a comprehensive analysis of successful KTPs undertaken to uncover both the origins and nature of particularly effective elements.

The key to KTP lies in what one might describe as its 'holistic' nature and its lasting value: every element and process, beyond its immediate function, builds the firm's capacity to absorb new knowledge and embed culture change, which are vital for continuous innovation. Firms experienced in open innovation recognise that considerable effort and investment can be required to embed and exploit its outcomes (Cope et al. 2009). With the KTP model, energy invested in any element of the scheme, whether it be identifying the partnership team or writing the final report, also contributes to these higher goals.

Take, for example, the apparently bureaucratic task of writing the proposal. Time spent at this stage not only ensures a good application, it also enables shared objectives to be developed, trust to be established and team-building to begin. These are the foundation stones of a successful project. Similarly, time spent on planning the project ensures that the key elements for effective KT are recognised and included. In the same way, the preparation and writing of the final report is not simply a funding requirement. It offers a valuable tool for feedback and review, which are critical elements in organisational learning that have lasting value for the firm beyond the intrinsic task.

Through KTP we learned how to collaborate with Universities and now collaborate with Leeds, Kent and Strathclyde.

James Leckey Design

Before our work on the KTP programme we did not carry out any R&D at the company. We have now embraced innovation and over the last few years have coordinated a large European research programme and co-authored academic papers. We are now one of the most innovative polymer processing companies in the UK.

Cherry Pipes

The project was identified as a result of the lack of IT development capability - not an area in which there were off the peg solutions for our industry. KTP had major strategic impact on business, it gave us new areas of business to attract major clients. We were acquired by US business as a result of the new clients and we are using our new capability to integrate the solutions we developed with other parts of the group. We could not have acquired the expertise any other way and have carried on the relationship with the university.

Powerchex

Table 1

Business views of the value of KTP.

KNOWLEDGE TRANSFER PLAYS A KEY ROLE IN INNOVATION AND GROWTH



It is now known that innovation is the greatest driver of growth, productivity and jobs in the UK. Indeed, between 2002 and 2008, half the growth in the UK economy could be attributed to the six per cent of companies that were most innovative. Furthermore, this so-called ‘Vital 6%’ achieved double the sales growth of non-innovating companies and twice the level of growth in jobs (Nesta, 2009).

At the same time, trends in innovation have moved from being generated within a firm to being driven by knowledge and resources outside, such as from universities or research institutes. According to the Community Innovation Survey, almost a quarter of all UK firms reported that 40 per cent of their innovation projects relied on published university research (CIS7, 2010). This approach has been termed ‘open innovation’. If, previously, innovation has been dependent on the internal culture and management of a company, today it relies largely on connections with external organisations

such as universities.

In the UK, however, there are recognised to be inherent barriers to collaboration between universities and firms. These can inhibit the drive for increased innovation and undermine the benefit to the economy brought by investment in Britain’s public research systems. Furthermore, the global reach of multi-national corporations presents a further threat since they are in a position to exploit the research of countries such as the UK but deliver the economic benefits elsewhere. It is vital, therefore, that bridges are built for knowledge transfer to indigenous businesses whose currently limited capacity to undertake open innovation may inhibit performance.

Today, the task of finding the best strategies to transfer knowledge for innovation between businesses and the so-called ‘Knowledge Base’ (UK universities, further education institutions, public sector research institutes, and research and technology organisations) is critical (Chesbrough, 2003).

THE CHALLENGES OF KNOWLEDGE TRANSFER IN OPEN INNOVATION

In order to analyse the various challenges for KT, and to show how the KTP offers tried and tested ways of addressing them, the study has divided up the KT process into a number of stages. It should be understood, however, that open innovation is not linear. It is an iterative process, a process of learning by doing, or 'action learning', as it is known. In order to be successful, open innovation requires continual review and reflection.

PATHWAYS TO OPEN INNOVATION

01

A business recognises that there is an opportunity or a problem that it could address if it had access to the necessary knowledge, skills and expertise.

Barriers to success include:

- Lack of awareness of opportunities and issues facing the business
- Lack of awareness of new knowledge
- Lack of understanding of the potential of universities to provide relevant information and knowledge
- Weakness in networks and information, and difficulties in finding the right partner within a university

02

The partnership begins with a joint analysis of needs and solutions, appropriate research and willing researchers within the institution.

Barriers to success include:

- Different incentives and objectives
- Unrealistic expectations on either side
- Legal formalities

03

The researchers' generic knowledge is adapted or 'localised' to meet the specific needs of the business. The knowledge from the academic and business domains is synthesised. This requires collaborative working and the building of trust amongst the partners.

Barriers to success include:

- Differences in 'language' and timescales
- Issues of relationship management and trust

04

As the project develops, the partners create the opportunity for innovation in process, product or markets. This depends on the firm's ability to absorb new knowledge ('absorptive capacity') and also on its ability to deliver.

Barriers to success include:

- Lack of absorptive capacity and effective internal structures and communications in the business
- Difficulties with change management and organisational learning

05

Success in the market place and adoption by end users is the mark of successful innovation.

Barriers to success include:

- Access to finance.
- Lack of Intellectual Property Rights (IPR) clarity.

WHAT DEFINES A GOOD PARTNERSHIP?

The OECD (2006) offers succinct insights into the nature and function of partnerships in the knowledge economy, viz:

AGREEMENT

A partnership is an agreement to do something together that will benefit all involved, bringing results that could not be achieved by a single partner operating alone, and reducing duplication of efforts. A successful partnership enhances the impact and effectiveness of action through combined and more efficient use of resources; promotes innovation; and is distinguished by a strong commitment from each partner.

CO-OPERATION

Co-operation within a partnership is collaborative; it will be effective if the partners share a strategic vision, pursue compatible targets, and are all equal members in a predetermined organisational structure. The notion of “ownership” is often used in this context to describe the emotional binding of the institutions and persons involved, which should ideally be with the partnership and not with other, outside organisations. Thus the partnership should be able to bring together different actors in collaborative action as well as in collaborative efforts to effect change.

CO-CREATION

The key to success for the partners is the co-creation of an intellectual asset (for example a new business process or product development process) under the partners' control and this requires a deliberate series of actions to embed the knowledge as a changed capability.

Table 2

Definitions of a good partnership

KNOWLEDGE TRANSFER PARTNERSHIP

Businesses experienced in open innovation understand the importance of team-building, of jointly analysing needs and developing solutions as well as synthesising academic and business knowledge. They also recognise that effective project management is critical for creative teamwork and that considerable effort and investment is required to embed and exploit the outcomes of open innovation (Cope et al. 2009).

However, for many firms, particularly SMEs, a lack of skills in innovation management has been reported as a significant barrier to innovation (Innova, 2010). For such firms, the filtering and qualification approach that has emerged to support the KTP model provides a structured framework in which these skills can be developed in a sustainable fashion. Before discussing the particular value of the KTP for knowledge transfer in open innovation, let us look at how KTP works and who is involved.



KTP: KEY PLAYERS

The Partnership

A partnership is formed between a knowledge base partner (such as a university) and a business. The objectives of this partnership are to work on a project of commercial benefit to the business which requires knowledge, skills and expertise not available to the business. These will be provided by the knowledge base partner through the activities of the academic supervisor.

The Adviser

The Adviser is provided by the Technology Strategy Board to support the partnership in the development of its proposal and advise on the managerial aspects of the KT process. The Adviser is critical to the mediation of successful partnership building in the initial stages of the project and also in contributing professional expertise in knowledge transfer, thus supporting the partnership to a successful conclusion.

The Associate

One or more appropriately qualified graduates are recruited by the partnership, employed by the university but embedded in the business to work on the project. The Associate not only acts as a conduit of knowledge from the academic supervisor but also acts as a knowledge creator through the process of synthesising and developing knowledge from both the academic and business domains. The Associate also operates to instil that newly created knowledge in the business's employees and processes so that the benefits to the business are sustainable.

The Associate is supervised for one half day per week on the business premises by the academic supervisor, who thus assists the Associate to convey the knowledge and expertise that the business needs.

The Associate is also allocated a business supervisor to ensure that he/she has access to the resources (such as other business employees) that are necessary. The business supervisor is accountable for the performance of the business's obligations on the project.

The Associate is focused on the success of the partnership and therefore can act as a neutral knowledge broker.

The Funder

The costs of the project are supported by a grant which may come from the Technology Strategy Board and other funding organisations, depending on the subject area or location of the project.

HOW ARE GOOD PARTNERSHIPS BUILT?

Spence (2006) developed seven clear rules for the development of good partnerships which are summarised here:

- Look for common ground; find shared values, personal experiences. Pay attention to and give feedback; accept differences.
- Learn about others; consider their perspectives and needs, appeal to the highest motives, let others express freely.
- Critique results NOT people; make others feel good, avoid criticism and put-downs.
- Give and get respect, considerate and friendly, put yourself in other person's shoes; be responsive to emotions; speak with confidence but remain tactful.
- Proceed slowly - one idea at a time; check for understanding and acceptance before the next. Speak in an organised and logical sequence.
- Be explicit and clear; share ideas and feelings; pay attention to non-verbal communication; eye-contact. Select words that have meaning for listeners.
- Communicate clearly and concisely.

Table 3

Building good partnerships



KTP: KEY STAGES AND PROCESSES

Before we look at the inherent value of the processes of the KTP and how each element contributes (beyond the intrinsic task) to the higher goal of creating a culture conducive to innovation, we will first look briefly at the different stages and mechanisms. Again, we should make clear that, although we are describing a series of sequential steps, the process itself is iterative, depending for success on constant feedback loops. Continual reflection is the key to enabling the partners embed the new knowledge that they have acquired and draw lasting value from the KTP.

Expression of Interest (E.o.I)

The basic KTP operating model does not include a formal element of awareness raising. There is, however, a process that takes place prior to the submission of the E.o.I. in which businesses and universities, supported by the Advisers, act to filter potential partnerships. This is important because it serves to minimise the opportunity cost of pursuing inappropriate proposals. It also starts the process of making the partners aware of the requirements needed to develop successful partnerships.

The completion of an E.o.I is the first defined process of the KTP. It documents the key principles of the proposed partnership, including:

- Knowledge and capability development sought and the business need or opportunity that requires the knowledge or capability.
- Outline of project, key stages and potential commercial impact.
- Academic team and capabilities.
- Business accounts and balance sheet for assessing the viability of the business.

These details enable the potential funders to check the project against their own criteria and availability of funds. The Adviser checks that the proposed project indeed requires knowledge transfer, rather than basic research or consultancy, and fits within the KTP framework. At this stage, there is no guarantee that a project suggestion from a partnership that produces a successful E.o.I. will result in a successful proposal.

Proposal Development

This is when the full formulation of the project takes place. It is important to note here that several of the partnerships studied for this report considered the application process to be somewhat cumbersome and lengthy. However, as suggested above, time and energy invested at this stage is not wasted. Processes such as the proposal development offer an indication of the time and resources necessary for successful outcomes. As such, they play a useful role in helping such businesses understand, early on, whether they have the human and financial resources to invest in a KTP.

The task of proposal development is vital for the partners to start learning the collaborative processes necessary for innovation. It is through developing the proposal that the partners begin building trust and working on shared objectives. Indeed, the proposal development is a critical step on the path to achieving the culture change necessary for open innovation. Indeed, a failure to understand the input necessary for successful innovation can sometimes lead to firms giving up half way through the process. They often blame 'burdensome or bureaucratic processes. However, these processes play a very useful role in helping such businesses recognise, early on, that they are not prepared to invest the time and resources necessary for success. benefits drawn from the project are sustained.

The proposal forms the initial working document of the project and includes:

- Business case and indication of investment needed to realise the benefits.
- Academic benefits and challenge that motivates the academic partner.
- Number of Associates required; person specification and development opportunities for the role.
- Work plan including activities that will promote embedding, activities from which the Associate will gain commercial experience ('commercial exposure') and deliverables.
- Business and academic team, including a specification of the people who will be on the Local Management Committee ('LMC') – the Steering Board for the project.
- Joint commitment by the two partners to meet the project needs.

Both the E.o.I. and proposal development phases are supported by the Adviser and, where available, any specialised KTP support within the Knowledge Base institution. The Adviser acts as the quality control in the submission of the proposals to Partnership Approvals Group (PAG).

Recruitment of Associate

The process of recruiting an Associate is undertaken by the partnership (the university and the business share the decision) and it is the official start of the project. As will be seen later, the Associate plays perhaps the most important role in the KTP.

He or she is the conduit through which knowledge flows between the university and business. He interprets the new knowledge for both partners and ultimately works to synthesise it. Effective KT and culture change depends on the Associate being recruited from outside the firm.

Project implementation

The project is facilitated through a formalised project plan provided as part of the KTP model. The Project Plan lays down a basic standard for interaction between the partners and a system of project management. However, as collaboration develops, our research shows that these formal interactions tend to give rise to additional and less formal interactions as the project implementation exigencies require.

The Project plan includes:

- Meetings between the academic supervisor and the Associate.
- Meetings of the partners with the Associate.
- Arrangements for Associate training in project-specific knowledge domains. Generic management training is provided centrally by the Technology Strategy Board.
- Local Management Committee ('LMC') meetings. LMC meetings are the mechanism through which reflective learning is achieved. There is an important element of flexibility here that encourages adaptation of the process within the overall project to meet the needs of the partners.

Preparation of final reports

Preparation of final reports on project achievements and the experience of KTP by the partners and the Associate is the final stage of the project. The Adviser prepares a commentary on the final report.

As suggested at the outset, beyond being a requirement of the KTP demanded by the Technology Strategy Board, the final report is an opportunity to reflect on the whole project. It enables the partners to draw additional lessons and feed them into future strategies. It is one of the important feedback loops of the KTP, which goes towards enhancing the partners capacity for absorbing new knowledge and ensuring that the benefits drawn from the project are sustained.

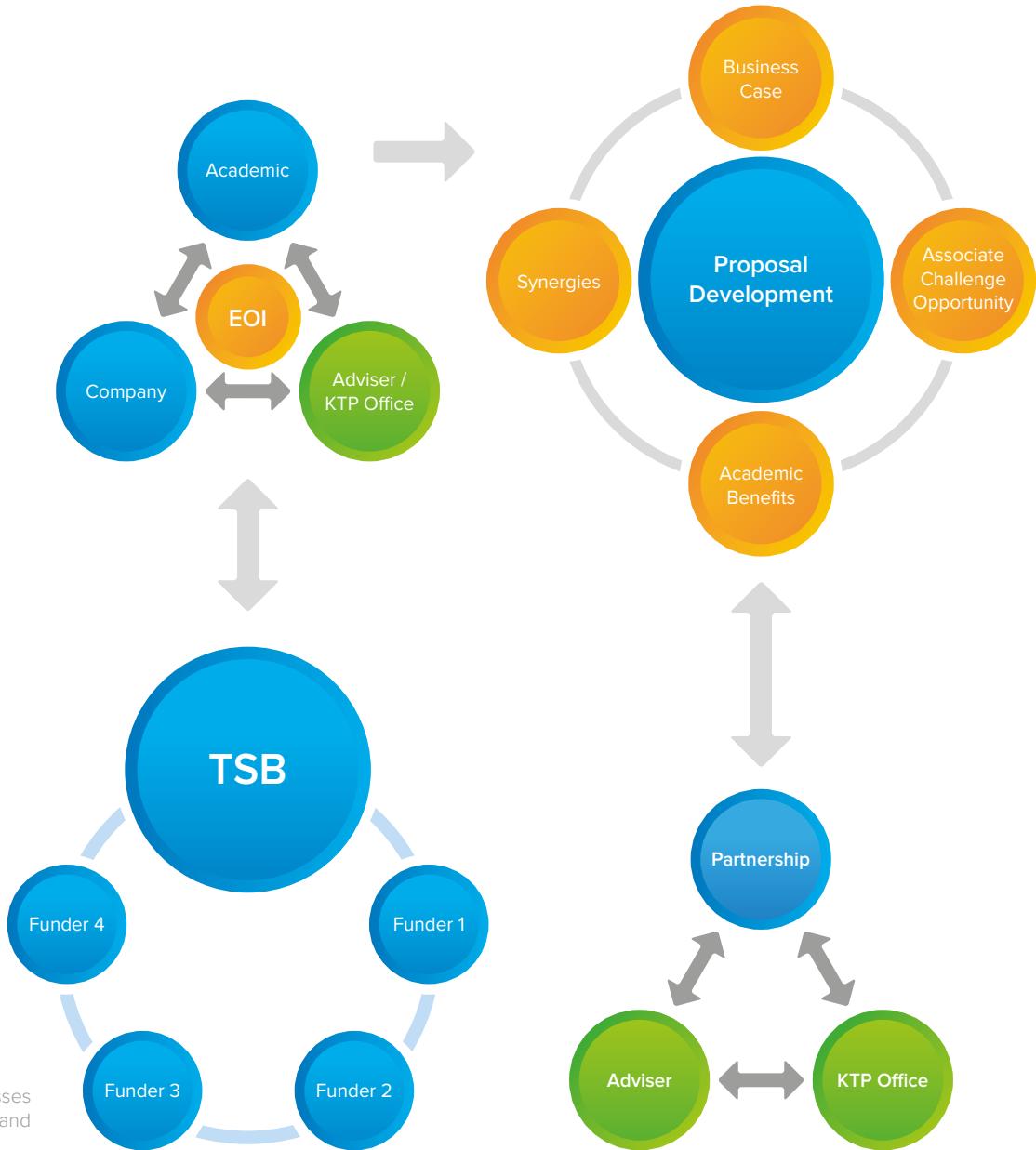


Figure 1

Initial KTP Processes in Practice (E.o.I. and Application)

WHAT MAKES THE KTP PARTICULARLY SUCCESSFUL IN BREAKING DOWN THE BARRIERS TO KT?

In seeking to understand how the KTP operates to deliver successful knowledge transfer projects, it is necessary to understand the conditions and actions which build and maintain collaborative partnerships in general. Several studies highlight the importance of mechanisms to build trust and the importance of the business being able to absorb and adapt knowledge for successful innovation, its 'absorptive capacity'. In addition, they underline the importance of individuals who are able to help bridge the differences between the knowledge base and business. (Cope et al., 2009; Bruneel et al., 2009 (b)).

A recent study suggests that the KTP facilitates knowledge transfer through the establishment of frequent personal interactions between the partners. This interaction focuses around a joint enterprise that gives rise to mutual engagement and the development over time of shared knowledge. By drawing together partners from different communities, the KTP offers opportunities not only for knowledge transfer but also for creating new

knowledge as partners and their communities absorb information and give it their own meaning (Gertner et al., 2011). Indeed, our research shows that the most successful KTPs are those where sufficient time and thought has gone into building the right team.

Boundary spanners: the importance of individuals who bridge the two communities

The value of the Associate role

The KTP model allows the business partner to supplement their in-house resources through the Associate who brings academic knowledge into the business context and manages it together with the business knowledge, thereby enabling a synthesis of the two.

The KTP derives much of its effectiveness from the continuity and project focus of the Associate, coupled with their responsibility as a proactive project manager owning the success of the partnership. None of the other key players is in such a position.

Thus, the Associate plays a particularly valuable role in the KTP. Indeed, the selection of the Associate is perhaps the most important decision that the partners will take. The study highlights the importance of recruiting the Associate from outside the firm, rather than being nominated from the business's existing staff. There are a number of reasons for this:

- A key focus of the KTP is to embed culture change within a firm. Given this priority, someone not 'native' to that business environment is likely to be more effective in facilitating change.
- It would be unusual for a business to possess an employee who had the required attributes and could be dedicated to the partnership project. If it did have such an employee it is unlikely that they would need a KTP.

Training and development for the Associate are a key part of the KTP. The study has shown that project-specific training is valuable not only to the Associate as a matter of personal development. It is also important for the partnership in order to facilitate the acquisition and assimilation of the new external knowledge needed to achieve the project goals. The presence of the Associate within the firm also helps ensure that the benefits from the new knowledge are sustained.

The value of the Adviser role

Advisers act as mentors in the preparation for and the implementation of KTP projects and specifically focus on managerial requirements. The Adviser can increase the probability of a partnership being successful, through a willingness to make context-dependent interventions, providing support and mentoring. The Advisers perform their roles in a highly discretionary manner, bringing themselves into the partnership where required. Their attendance at Local Management Committee meetings allows them to customise their interventions to an individual partnership.

Advisers are valuable to the partnership for:

- Being an objective authority, trusted by the partners, who can review proposed changes to the project and sanction them on behalf of the Technology Strategy Board.
- Challenging the partners and suggesting ways in which opportunities may be taken or KT problems overcome.

- Mentoring the Associate and protecting his or her agenda against short-term business priorities that might come in the way of the KTP project.
- Ensuring that requirements for Associate training are met and that he or she has access to business and academic staff.
- Bringing new contacts and information to partnerships through knowledge of other partnerships.
- Acting as an interpreter between the worlds of business and academia, ensuring that the partners understand each other.

Importance of mechanisms that build trust and allow organisational learning

Organisational learning requires reflection and reaction where problems and opportunities are resolved through ‘insightful’ discussions around a real-time problem. Managers and entrepreneurs play a crucial role in building this ‘learning potential’. A critical source of understanding of the nature of organisational learning comes from the body of literature on ‘Action Learning’. This literature highlights the importance of moving from ‘talking about doing’ to ‘actually doing’.

KTP is particularly successful at helping businesses learn by doing and so overcome the barriers to absorbing new knowledge and putting it into practice in the business. It provides the effective managerial processes that are needed to adapt this knowledge into routines and systems so that it can be embedded at the organisational level.

The Project Plan is the KTP’s key mechanism for organisational learning and team building. Over half the partnerships studied made the un-prompted comment that the Project Plan was valuable. It was seen to:

- Offer a structure that stimulates informal contacts but also provides a controlled means of discussing changes to project plans.
- Provide a framework for regular review and reflection, enabling lessons learned to be fed into future planning.
- Encourage learning by doing or ‘action learning’.
- Facilitate accountability and the clarity of roles and also help in partnership building.
- Focus attention on the project through the regularity of contact. Regular attendance by the Academic supervisor is particularly important in this respect.

- Allow wider contacts to be established through the Local Management Committee. This strengthens partnership bonds and enables knowledge to be embedded.

The embedding process is critical to knowledge transfer and the sustainability of benefits for the partnership. As evidence from the most successfully innovating firms shows, it is crucial that staff from the business partner invest sufficient effort and time to absorb or embed the knowledge that they have gained.

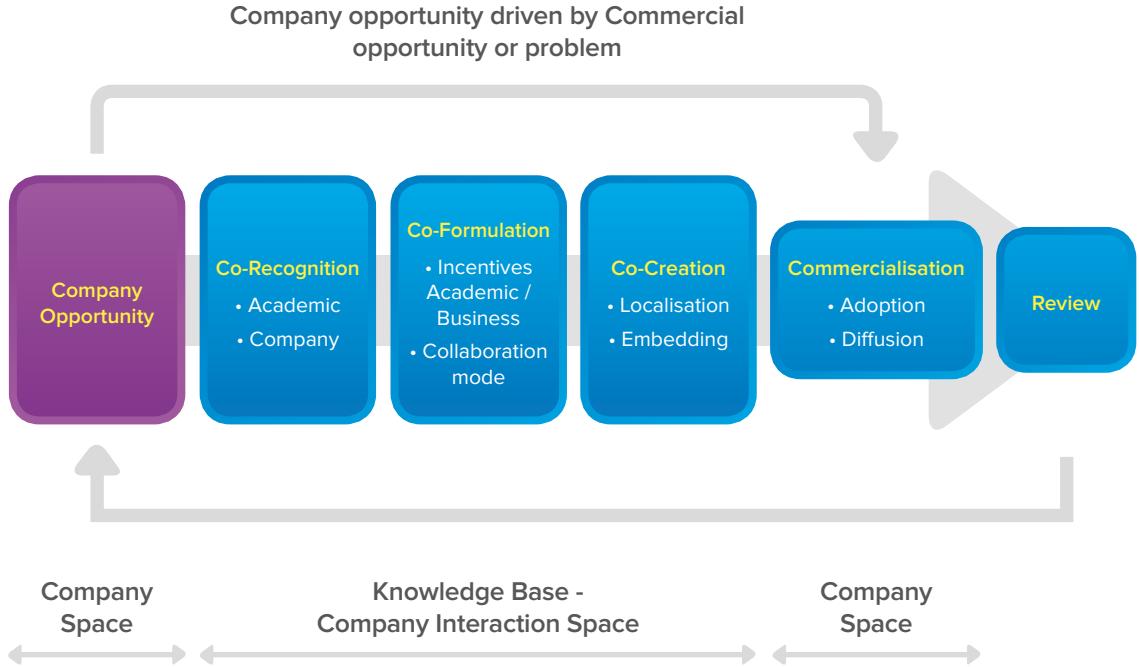
HOW WELL DO KTP MECHANISMS MEASURE UP AGAINST BEST PRACTICE IDEALS?

Finally, in order to assess the extent to which the KTP offers good practice solutions for knowledge transfer between academia and business, we have built a generic model of good practice for successful KT. This model is based on extensive research, including 200 case studies of successful collaborations, as well as international studies of best practice and it shows the ideal attributes and outcomes of knowledge transfer. More detail can be found on the model in the full report: Key Attributes for Successful Knowledge Transfer Partnerships (Ternouth et al, 2012).

The model has five stages, which correspond to the five stages outlined in the section Pathways to successful innovation, above. We have named them as follows:

- **Company Opportunity (C1):** Business recognition of opportunity or a problem that could be addressed with access to knowledge, skills and expertise.
- **Co-Recognition (C2):** Partnership begins with a joint analysis of needs and solutions and willing researchers within the institution.
- **Co-Formulation (C3):** Knowledge is adapted to meet the needs of the business. Business and academic knowledge is synthesised.
- **Co-Creation (C4):** Partners create the opportunity for innovation in process, product or markets.
- **Commercialisation (C5):** Success in the market place and adoption by end users.

Figure 2, below, maps out this model framework. It should be noted that, while the 5 Cs model is presented in a linear fashion, knowledge transfer is not a linear process. Once an innovation project begins, the process of knowledge transfer and exchange may move backwards and forwards through the different stages in an iterative and recursive way. Indeed, it should be expected that as the project emerges, new knowledge will need to be drawn in.



If we now map the stages of the KTP against the generic 5Cs model, we can see how it measures up. Table 4 on the following page sets out the five stages of the generic model with operational mechanisms for successful knowledge transfer. It shows how the systems and roles within the KTP programme map onto the solutions shown to be good practice in the model.

Figure 2

Generic Process Model for KT in open innovation (5Cs)

5 C's Model Elements	Operational Strategies for Success	KTP and Processess
Company Opportunity Recognition	Promotion and Marketing	
	Knowledge brokering	<ul style="list-style-type: none"> • KT offices • Adviser • E.o.I
Co-Recognition	Building team and trust	<ul style="list-style-type: none"> • Adviser • E.o.I
	Collaborative partnership formation	<ul style="list-style-type: none"> • Application process • Adviser
	Boundary spanning	<ul style="list-style-type: none"> • Associate (in project) • Academic supervisor
Co-Formulation	Boundary spanning	<ul style="list-style-type: none"> • Partners and Adviser (pre-project) • Association (in project) • Adviser (in project opportunities)
	Knowledge socialisation	<ul style="list-style-type: none"> • Associate • LMC (in project)
	Action learning	<ul style="list-style-type: none"> • Partners
	Reflective learning	<ul style="list-style-type: none"> • Adviser • LMC
Co-Creation	Knowledge management and socialisation	<ul style="list-style-type: none"> • Associate • Business management and employees
	Organisational learning	<ul style="list-style-type: none"> • Management and employees
	Reflective learning	<ul style="list-style-type: none"> • Academic • Final report • Adviser
Commercialisation	Business processes and products re-engineered for innovation (R&D and graduate employees)	<ul style="list-style-type: none"> • Application process • Associate as employee • Increased academic engagement

Table 4

KTP processes mapped on to the generic 5 Cs Model of successful KT

CONCLUSION

In its fullest sense, the KTP model from the identification of business need to the completion of project and final reporting is not merely a series of processes but one single integrated model of people, processes and mechanisms with important 'feedback loops'. The success of the KTP model depends on this integration.

KTP has been shown to be particularly useful where businesses do not have sufficient expertise and resources to manage an open innovation partnership. KTP supports partners throughout the process and helps develop the skills and understanding needed to do this in both the substantive and managerial aspects.

The KTP process also comprises a number of specific additional value-adding elements which combine to deliver successful outcomes. These include:

- The mentoring role of the KTP Adviser for the business and the Associate.
- The role of the Associate and the Adviser in bridging and brokering between the research base and the business.
- The processes of partnership building and reflective learning which are encouraged by the KTP's formalised processes. These drive positive behaviours beyond their apparent administrative functions and can embed fundamental culture change within the business.

In conclusion, it can be seen that the KTP has the ability to transform a business and enable an increase in 'absorptive capacity' in businesses and the UK innovation system. This is achieved not only by the way it combines good-practice processes to overcome the barriers to knowledge transfer, but also because the model stimulates and facilitates organisational learning (figure 3).

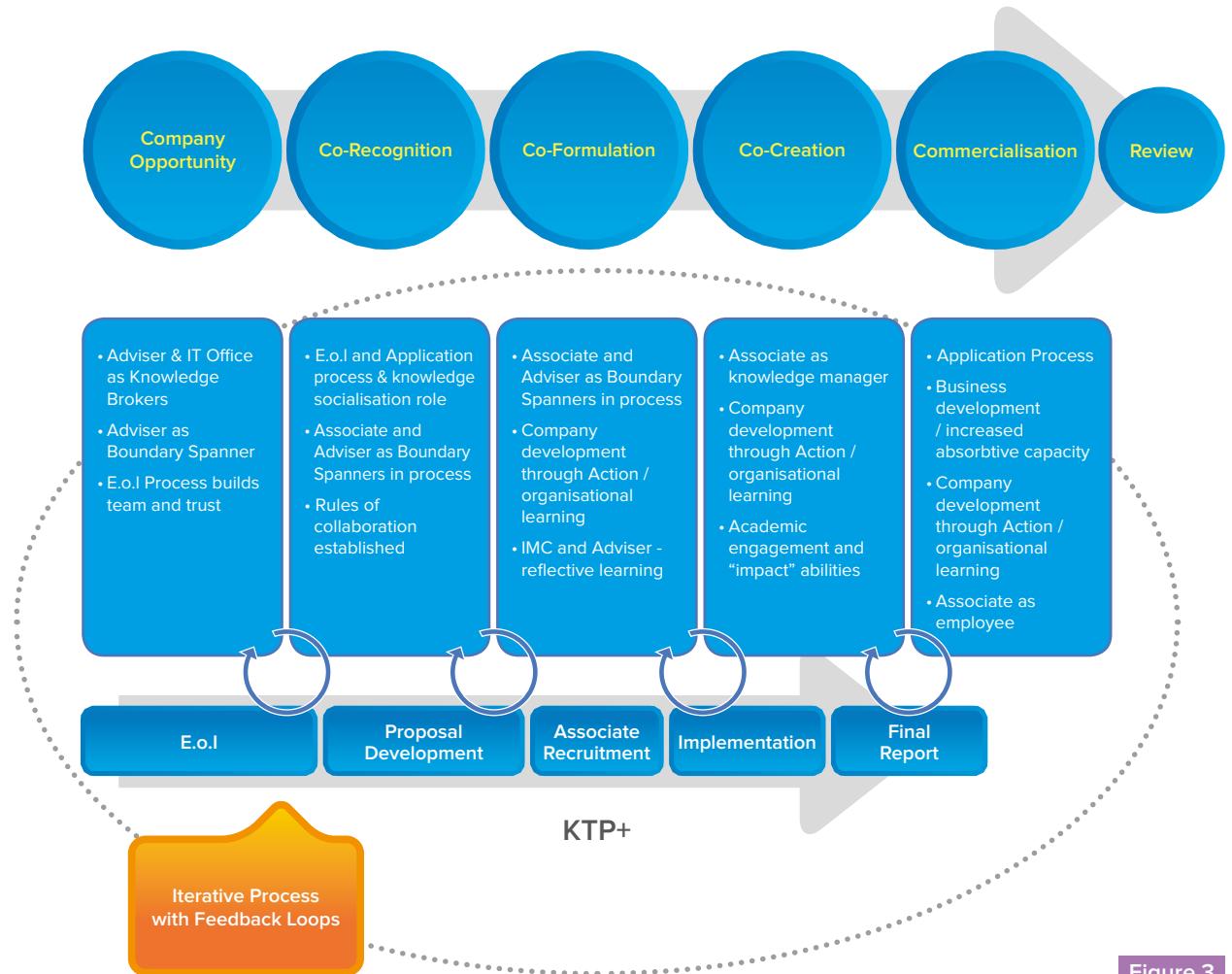


Figure 3

Showing the added value of KTP in terms of the model of ideal attributes and outcomes

REFERENCES

Bruneel, J., D'Este, P. and Salter, A. (2009). *Investigating the factors that diminish the barriers to university industry collaboration.* In: *Triple Helix VII. 7th biennial International Conference on University, Industry & Government Linkages.* Glasgow, UK 17-19 June 2009. Glasgow: Strathclyde University.

Chesbrough, H. (2003). **Open Innovation: The New Imperative for Creating and Profiting from Technology.** Harvard: Harvard Business School Press.

Cope, J., Garner, C., Kneller, R., Mongeon, M. and Ternouth, P. (2009). University-Business Interaction: a comparative study of Mechanisms and Incentives in Four Countries. In: *Initiatives in Comprehensive Understanding of Civilizational Issues: A New Era of Science and Bioethics.* Tokyo: Sasakawa Peace Foundation.

Department of Business Innovation and Skills (2012). *Community Innovation Survey (CIS) 7.* London: Department of Business Innovation and Skills.

Gertner, D., Roberts, J. and Charles, D. (2011). University-industry collaboration: a CoPs approach to KTPs. *Journal of Knowledge Management*, 15(4), pp.625 – 647.

Innova (2011). The Major Barriers to SMEs Innovation. In: Innova (2011). *Feasibility study on new forms of EU support to Member States and Regions to foster SMEs Innovation Capacity: Final Report.* Europe: Innova. Ch. 3.

NESTA (2009). *The Vital 6 per cent,* London: NESTA.

Ternouth, P., Garner, C., Wood, L. and Forbes, P. (2012). *Key Attributes for Successful Knowledge Transfer Partnerships,* London: CIHE.

