GETTING HITCHED – DEVELOPING SUCCESSFUL PARTNERSHIPS BETWEEN HEIS AND INDUSTRY

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ABSTRACT
The UK Government Department for Trade and Industry's Knowledge Transfer Partnerships (KTP) programme, was set up to facilitate strategic collaboration between universities and industry. In terms of economic benefit to industry, it has proved to be one of the most effective collaborative funding models in the UK [10]. In this paper we review two KTP programmes from Northumbria University's Design School, exploring issues involved in setting up and running these projects in the context of the emerging role of universities worldwide as key drivers of economic growth. This provides a valuable perspective for both academics and industry considering 'getting hitched' and has implications for a number of other Knowledge Transfer approaches, beyond KTP.

Keywords: Strategic Design, Partnerships, Knowledge Transfer, KTP, Industry, HEIs

1 ACADEMIC/INDUSTRY RELATIONSHIPS

1.1 Introduction
First we map six KTP case-study projects onto a spectrum of academic/industry collaboration based on a number of international studies, revealing the capacity of the KTP model to generate a wide range of collaborative activity.

Recognising the breadth in this activity, we then discuss the importance of ongoing changes in the scope of the KTP model of collaboration and how they have improved the dynamic between Northumbria University and its industry partners.

Then we outline two of the case-study projects in more detail to illustrate the circumstances that triggered the initial requests for help from those companies and to discuss the apparently simple task of agreeing with them on the nature of the problem observed. These case studies are also used to illustrate the different implications of the planning process for Design versus Engineering projects.

In conclusion we outline a number of key success factors in terms of establishing Knowledge Transfer programmes, the value they create and their educational impact.

1.2 UK National Context
To understand the role of KTP as a mechanism for building a strong collaborative relationship between Higher Education Institutions (HEIs) and Industry it is important to understand the political drivers for enlarging academic/industry collaboration.

Through recent policy proposals [3], the UK Government has signalled its growing interest in the contribution that HEIs make to regional economies and in particular, to its vision of a knowledge-based economy.
Whether through locally applied expertise or the assimilation of its graduate body into regional organisations, the HEI is increasingly viewed by the government as a vital driver of regional economic growth [4, 5]. The academic staff within are seen as having a vital dual role in this, indirectly through the graduates they educate, and also directly through collaborative research and commercial activity. This direct activity may range from advice/business-support functions, through technology-transfer projects, to more complex joint ventures and spinout companies.

1.3 International Context

Although much of the literature discussing relationships between academia and external organisations focuses specifically on the technology transfer area, a number of authors recognise that it is only part of a wider spectrum of collaboration.
The left side of the following table (Table 1) correlates a number of models of this spectrum of academic-industry collaboration. The right side maps the broad range of activities that each of six Northumbria University Design School's KTP programmes involve. It illustrates KTP's capacity to generate activity across the full spectrum of academic/industry collaboration.

Table 1 International models of the spectrum of academic-industry relationships (left) versus activity established via Northumbria University 's Design KTP programmes (right)

INTERNATIONAL	SWEDEN	UK	US		Northumbria University - Design School KTPs					
Arnold et al 1998 [1]	**Lofsten and Lindelof 2001 (based on Monck et al 1988) [6]**	**Lowe 1993 [5]**	**Steffensen et al 1999 [7]**	**Derived typology of academic-industry relationships**	**CASE STUDY 1 MKW Engineering**	**CASE STUDY 2 Nissan Manufacturing**	**CASE STUDY 3 P&L Systems**	**CASE STUDY 4 ALM Products Ltd**	**CASE STUDY 5 Penny Plain**	**CASE STUDY 6 Midland Steel Traders**
Information services	Transfer of knowledge	Publishing	Research publications	Publishing	pending		✓	✓	pending	pending
Advice		Collaborative research and publishing	Collaborative projects with students and/or staff	Advice	✓	✓	✓	✓	✓	✓
Technology demonstration and testing	Access to facilities			Access	✓	✓	✓	✓		✓
	Contract Development			Demonstration Projects	✓	✓	✓	✓	✓	✓
SME oriented services		Consultancy and testing		Consultancy	✓		✓		✓	pending
Problem-solving	Contract or Sponsoring research			Contract Research	✓		✓		✓	pending
Large R&D projects in new technologies	Transfer of knowledge and technology			Collaborative projects	✓		✓			
		Joint venture or license out	Licensing of patents	Technology Licensing	✓		✓	✓		
	Transfer of people			Joint Ventures	✓					
		University owned Spin-out	Planned spin-off	University owned Spin out						
		Independent Spin-out	Spontaneous spin-off	Independent Spin-out						
			Employ Graduate or researcher	Student/staff employment	✓		✓	✓	✓	✓

2 KTP AS A MODEL OF COLLABORATION

2.1 The importance of Post-Graduate level projects to the regional economy

It is the role of the Regional Development Agency (RDA) in the North East of England known as One Northeast (ONE) to enable National objectives defined by central government to be met. To ensure that its local HEIs stimulate the regional economy, its policy is to both encourage existing industry to make use of universities as an external R&D partner, and to encourage graduates to start new companies [11].

In response, Northumbria University is actively promoting a wide range of approaches to nurture start-ups and to support collaborative activities with industry and other organisations. KTP is a particularly valuable approach, as it encourages ambitious, strategic projects that operate at Post-Graduate level and evidence from Chalmers University in Sweden, an often-cited exemplar, suggests that HEIs make their greatest regional economic impact through post-graduate level projects [9].

2.2 From Technology-Transfer to Co-creation of New Knowledge

As one of the better-known mechanisms by which HEIs engage with outside organisations, KTP programmes are built on long established ideas. Teaching Company Schemes (TCS), was the forerunner to KTP and whilst structurally almost indistinguishable, was keenly focussed on the notion of Technology Transfer rather than the broader Knowledge Transfer expectation of KTP. TCS seemed to set an expectation that a University had technologies 'on the shelf' waiting to be commercialised and the purpose of the programme of work therefore involved 'Transfer' of that technology. This notion seems to set a hierarchy in the relationship from the outset. The changes in language to focus on 'Knowledge Transfer' and 'Partnership' immediately suggest a more equal relationship. It also changes the pressures within the relationship from one where the vocabulary used tasks the University with the 'Transfer', to one that establishes the idea of jointly researching and developing a solution. In the authors view, this creates a better foundation for an open relationship between project partners leading to a more successful outcome.

3 PLANNING AND NEGOTIATING KTP PROJECTS

3.1 Reaching a shared description of the project

Despite having secured funding for a number of Knowledge Transfer Partnerships, on leaving a first meeting with a new company that we hope to partner it is difficult not to feel besieged. Typically the initial meeting constitutes a discussion around an extensive array of seemingly intractable problems that the company is aware of and, often, has already tried and failed to solve with other measures. The challenge therefore, is to read this complex pattern of symptoms, to quantify the various problems evident, and then to work towards a diagnosis of the underlying causes. In this respect, the structure and rigour of the application process provides a helpful framework for evolving a clear understanding of the situation being considered. It is the view of the author that the intensive work invested in diagnosis at this stage is a key factor in achieving a successful KTP. To illustrate the important translation effect of this process of diagnosis, two case-study examples are included below.

In each case, the symptoms presented by the company at the initial visit are shown first, next the 'Analysis of underlying causes', are the derived statements about what may

really be causing the difficulties observed and last, the coherent statement of project aims as presented in the final funding application form is shown.

CASE A – PENNY PLAIN

Initial symptoms (as observed by the company)

- We are making far too many garment samples
- We have these two-day long 'design' meetings, there must be a better way
- We wait for weeks and then everything just appears and if it's not quite what we wanted it's too late to do anything about it.
- Every step seems to be last minute

Analysis of underlying causes (reflected back to company by the academic)

- Lots of design work but not enough design strategy decisions
- Outsourced design means there is no real input from other disciplines – the approach is too opaque to either question or to steer.
- Designer feels isolated, isn't sharing the risk and therefore gets defensive.
- Sales led instead of design led, ie building a range around last years top sellers instead of using design research and trend data to inform the new season.

Finalised short statement of project aims (from the funding application)

To establish an in-house fashion design process, which will use a new Travel Collection as a vehicle to extend the current range-planning processes in terms of brand development, design management and design process.

CASE B – MKW ENGINEERING LTD

Initial symptoms (as observed by the company)

- We want to reduce the non-working time of the CNC machining-centres by taking the task of programming them off the shop-floor.
- We want to reduce the time to manufacture to provide better value to the customer and to improve profits.
- We need to lift the role of part programmer, from jobbing machinist to one of problem-solver and advisor who understands the rest of the business.
- We need to take full advantage of our investment in new machinery.

Analysis of underlying causes (reflected back to company by the academic)

- To establish a new department/function, which adopts and develops new practices to manage design and manufacturing data.
- To establish a database of re-useable modules of programming from past projects.
- To develop new knowledge of best-practice in 5 and 7 axis machining.

Finalised short statement of project aims (from the funding application)

- To introduce a digitally-driven, fully-integrated quotation, design and manufacturing process using Computer Aided Design, Manufacture and Process Planning (CAD/CAM/CAPP) to improve the quality and efficiency of operation and speed of response to customer requirements.

One tension that develops through the process of translation shown in these examples is that whilst the final project application with its academic detail and technical language is necessary to make a compelling case to the funding panel, it can have become more difficult to comprehend for the company. It is therefore important that an open and ongoing dialogue with the company partner is maintained through the project setup period, to ensure they retain confidence in the academic team and the programme of

work being proposed. It is also important to recognise the level of trust the company partner has invested in the academic partner at this point of the application process.

3.2 Differences between Design and Engineering based projects

One important aspect of KTP funding is that it asks that a detailed, week-by-week work-plan be created describing the work of the programme constituting up to three years. Having developed KTP programmes for both Design led projects and Engineering led projects, it seems that the Engineering projects have a better 'natural' fit with the demands of this application process. The author's view is that there are two underlying reasons for this. First, the engineering projects seem to fit a *deductive* research model where a technical specification can be agreed early on and the work is then to deliver to that specification. This suits the advance planning required for KTP but is in contrast to the *inductive* approach preferred for design projects where the specification is expected to emerge through the explorative process. Second, there is a large theoretical base for engineering with a plethora of methods formalised through the literature. This ample toolkit gives engineering based project descriptions an authority that makes a compelling case in the application process (see CASE B project aims above). It is difficult to emulate this in design based projects as design generally deals with ill defined problems, also referred to as wicked problems (Buchanan 2001) that are often less technical and less well understood outside the discipline (see CASE A project aims above).

4 DISCUSSION

4.1 The Value created by KTPs

Northumbria's KTP portfolio generates activity across the full spectrum of academic/industry collaboration, and compared with the traditional Technology-Transfer expectations of its predecessor TCS, is less concerned with commercialisation of IP. Nevertheless, KTP programmes tend to result in significant, measurable benefits for the partner company [10] and have enormous potential as a mechanism to support the co-creation of new knowledge to the benefit of the regional economy.

4.2 Key success factors in establishing KTPs

The rigour required at the planning stage is a key factor in the success of the programmes although this can lead to an emphasis being placed on academic or technical language at the expense of easy comprehension for the company partner. The onus therefore falls on the academic partner to ensure an open and thorough ongoing dialogue with the company during the development of the funding application if they are to share ownership of the main objectives. Clearly, this applies beyond KTP to other models of funded collaboration between academic and industry partners

4.3 Educational Implications

For the University partner, valuable benefits accrue from KTP programmes, which enrich its teaching curricula including: new case-study material and visiting lectures from the company, student placement opportunities, collaborative student project opportunities and direct consultancy. KTP projects operate at Post Graduate level and the graduate that joins the company is encouraged to pursue a Masters qualification through the University. In our experience, this equips the graduate with potent reflective-practice skills that enable them to retain a strategic view of the situation in the company throughout the programme of work. Combined with the commercial experience they have accrued, these capabilities make the graduate indispensable and

they are often offered their first opportunities in management at the end of the KTP programme.

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