The Challenge of Business – University Collaboration: Context, Content and Process

Summary Report from an AIM/SMI Management Research Forum

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1 Preface

In December 2003 Richard Lambert released his report on business-university collaboration, which highlighted many examples of good collaboration, but called for further development and investment.[1] The Lambert Review also recognised that the UK Government is pursuing an agenda of regionalisation and devolution and argued that the devolved administrations would have to consult on how best to take his recommendations forward. These comments set the scene for this report, which explores the challenges of business-university collaboration and identifies their implications for practice and policy.[2]

The UK's Advanced Institute of Management Research (AIM) and the Scottish Manufacturing Institute (SMI) at Heriot-Watt University conducted a joint Management Research Forum to address this issue, focusing particularly on the Scottish context. During the Forum, held at the Royal Society of Edinburgh (RSE), invited attendees from industry, academia and public service explored the links between universities and their local economies. The discussions centred on the experience of other parts of the UK and Europe, included examples of effective models and proposed practical mechanisms for improved links between universities and business.

Following the Forum, four AIM Scholars conducted further research into the ideas generated and devised this Post Forum Report as a basis for further discussion. The Management Research Forum is a model used by AIM on previous occasions that has been proved to be highly effective in generating ideas and delivering action-oriented recommendations for stakeholder consideration.[3]

We are most grateful to the AIM Scholars, to their business schools for releasing them, to the ESRC and EPSRC who are providing funding to AIM and to EPSRC who are funders of the Scottish Manufacturing Institute under the UK Innovative Manufacturing Research Centre programme. We are grateful also to Rachel Bowes and Marianne Watson who undertook organisation for the Forum and to Dr William Duncan, Executive Secretary of the RSE, for making their premises available for the Forum. Finally, we would like to thank all the participants for their time and valuable contributions to the discussion throughout the Forum.

Professor John E L Simmons

Vice-Principal
Heriot-Watt University
and
Director
Scottish Manufacturing Institute

Professor Andy Neely

Deputy Director
Advanced Institute of Management Research

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[1] Lambert, R. (2003), "Lambert Review of Business-University Collaboration", HM Treasury, London, December 2003.

[2] We will refer throughout this report to universities, but readers should take this to include all Further and Higher Education Institutions and public research institutes.

[3] Other reports in this series include Bloom, N.; Conway, N.; Mole, K.; Möslein, K.; Neely, A.D. and Frost, C. (2004) "Solving the Skills Gap", Summary Report of the AIM/CIHE Management Research Forum and Birdi, K.; Denyer, D.; Munir, K.; Neely, A.D. and Prabhu, K. (2003) "Post Porter: Where Does The UK Go From Here", Summary Report of the AIM Management Research Forum and input to the DTI Innovation Review. Copies of both reports are available from AIM (www.aimresearch.org).

2 Executive Summary

On 27th April 2004, at a joint Forum of the Advanced Institute of Management Research (AIM) and the Scottish Manufacturing Institute at Heriot-Watt University (SMI), academics, practitioners and policy makers discussed the challenges of business-university collaboration. This report assesses the discussions that took place at the Forum and contends that:

1 "Context Matters":

To assess and improve business-university collaboration in the UK, we need to move beyond the neat picture presented by policy-makers and engage with the messy, complex and interconnected nature of the local, regional and national context.

Following Lambert's view that "proximity matters", the report argues that each regional context has its own drivers for and barriers to fruitful business-university collaboration. The Management Research Forum positioned the discussion in the Scottish context, which given its strong research base and wide availability of support mechanisms, appears to be a challenging one. The problem seems to be as much a lack of 'industry pull' as a shortage of 'university push'. Nonetheless, throughout the UK, opportunities for mutually beneficial collaboration exist but require more effective links between universities and business.

2 "Content Matters":

Productive business-university collaboration depends critically on an adequate understanding of and differentiation between classes of problem. It also depends on putting in place effective modes of collaboration that are appropriate to the class of problem.

Taking into account the role of different classes of problem as well as the diversity of academic and business institutions with different collaboration advantages and demand structures helps to overcome the naïve picture of a "one size fits all solution" for business-university collaborations.

3 "Process Matters":

There are significant institutional constraints to business-university collaboration, which stem from institutionalised values and practices that have deep roots in the current Higher Education system.

The key challenge for business-university collaboration lies not only in ensuring that potential collaborators have the opportunity to make connections, but also that the process of collaboration is effective.

To summarise, this report argues that there is no 'one size fits all' for business-university collaborations. A broad range of support mechanisms are already in place, but they often build on a too simplistic picture of the worlds of business and Higher Education and therefore fit only a relatively small proportion of potential collaborations. We need to take into account the basic characteristics of collaboration in the three dimensions discussed if we are to achieve a more productive outcome from the many ongoing initiatives and projects that try to enhance the quantity and quality of business-university collaboration.

2.1 Policy Recommendations

The specific recommendations made in this report include:

Take account of the context

Policy for business-university collaboration must take account of the industrial context and existing support landscape. This should include recognition of the diversity of collaboration requirements within and between large and small firms given firm and industry characteristics, the need for appropriate and accessible financial and commercial support and the effectiveness of existing support mechanisms.

Take account of classes of problem

Policy must take account of different classes of problem within businesses. Some may require collaboration with academics to generate new knowledge, while others are more straightforwardly addressed through the transfer of existing knowledge.

Provide appropriate incentives

To initiate collaboration all parties must believe that there will be appropriate mutual gain and financial outcomes. The structure of financial and other incentives has to recognise that there are multiple stakeholders in any collaboration, including the business, university central administration and the individual academic(s).

Improve communication between business and universities

A significant problem for business is to understand what universities can offer them. Methods for improving communications are required. Universities should make more effort to clarify and communicate their specific strengths and areas of expertise.

Enhance the use of relevance criteria in the RAE

Improve the assessment of the practitioner relevance of research in the Research Assessment Exercise (RAE), either by using measures of knowledge transfer activities or by assessing the practitioner impact of journals. Even if this assessment were not used to determine funding levels, it would help external parties locate relevant knowledge within individual departments.

Extend the use of relevance criteria in Funding Council decisions

Funding Councils are beginning to focus on user relevance but this is still seen as less important than academic rigour. Research Councils should seek to redefine 'quality of science' giving a more balanced weighting to both rigour and relevance.

Change promotion criteria within universities

It should be possible to be promoted on the basis of enterprise and outreach activities, alongside research. Therefore, promotion panels should be encouraged to broaden the definition of academic excellence to include outputs with clear practitioner relevance.

Improve clarity, transparency and fairness of the IP process

Processes for the creation and ownership of intellectual property (IP) among individual academics, universities and business should be clear, transparent and realistic to incentivise collaboration.

2.2 Research Recommendations

The insights from the Management Research Forum and subsequent discussions indicate that there is a need for further analysis. We suggest the following topics:

Develop social network maps of regional business-university collaborations

In order to gain a more complete understanding of how knowledge transfer works and the capability of the various agencies to support it, we need a more detailed understanding of the relationships between key players in the regional economy. This could be achieved through a regional social network analysis, focusing on the use of university-based knowledge by business as a dependent variable.

Undertake international comparison of models of business-university collaboration

We still have much to learn from models of effective practice in other countries and the path dependent factors that determine whether and why these models are effective. Such research should also examine how these models might be applied in the UK context.

Investigate the R&D needs and capabilities of SMEs

In order to understand how the research base might be useful to SMEs, we need to identify the different classes of problem they face that might benefit from sourcing knowledge externally.

Identify and examine methods for assessing research relevance

One of our policy recommendations suggests incorporating measures of practitioner relevance into the RAE. We need, however, to be sure that the measures adopted are valid and that they do not overestimate certain types of engagement or neglect others.

Qualify the economic value of collaboration

Much of this report has been written as if the economic value of collaboration between business and universities is not in doubt. We need to know more about the extent to which collaboration with universities increases the productivity of firms. Understanding this would provide valuable insight into the extent to which support for collaboration should be funded.

3 Table of Contents

4 Introduction

Business-university collaboration is increasingly seen as critical to economic performance. The evolution of traditional corporate R&D laboratories and the rise of open innovation and user-driven innovation processes (Chesbrough, 2003; Lambert, 2003; von Hippel, 2001) are seen as important drivers of this trend, especially from a business perspective. From a university perspective, the importance of knowledge creation in a practitioner context, in comparison to traditional academic knowledge creation processes (Gibbons et al., 1994), is becoming more widely acknowledged.

The Management Research Forum jointly organised in April 2004 by the UK's Advanced Institute of Management Research (AIM) and the Scottish Manufacturing Institute (SMI) at Heriot-Watt University engaged a range of stakeholders in business-university collaboration in a wide ranging, practice-oriented discussion. The collaboration gap, identified in the Lambert Review, published in December 2003, provided an important starting point for the discussion.

> *The Lambert Review*
>
> *"… although there is much good collaborative work underway already, there is more to be done. Universities will have to get better at identifying their areas of competitive strength in research. Government will have to do more to support business-university collaboration. Business will have to learn how to exploit the innovative ideas that are being developed in the university sector".*
>
> *Source: Lambert 2003, p 2*

Participants in the Management Research Forum were asked to examine this collaboration gap head on, by discussing what it means "to get better", "to do more", "to learn how to exploit innovative ideas". Following Lambert's view that "proximity matters" the Management Research Forum positioned these questions in the Scottish context. Participants were asked to identify what key drivers, barriers, constraints and opportunities must be taken into account if Lambert's vision of collaboration is to be translated into day-to-day practice in the Scottish economy and the wider UK economy and to make recommendations for policy and for further academic research.

4.1 How this Report was Devised

Four AIM Scholars were selected to engage in and facilitate the discussion at the Management Research Forum and subsequently to produce the report in collaboration with AIM staff. The people involved in the project include:

Dr. Lisa Bradley, University of Ulster

Dr. Geoff Gregson, University of Edinburgh

Dr. Zella King, University of Reading

Dr. Judy Pate, University of Glasgow

Dr. Kathrin Möslein, AIM Research Associate

Professor Andy Neely, AIM Deputy Director

4.2 What the Report Contains

This report is the result of the team's reflection on the discussion at the Management Research Forum and subsequent desk research. The overall objectives of this report are to build on the Lambert Review of Business-University Collaboration (2003) by:
- Presenting additional research evidence on the drivers of and constraints on business-university collaboration and identifying promising design principles for future best practice.
- Grounding the discussion of business-university collaboration in current academic literature.
- Presenting policy recommendations to inform public discussion.
- Presenting research recommendations that could feed into academic enquiry.

The report does not attempt to provide a comprehensive or systematic review of the literature in the field. It aims to map the field in a way that gives a fresh perspective, based on insights from all the participants at the Forum, and to move forward the discussion on how to facilitate productive business-university collaboration.

We ground our discussion with reference to the Scottish economy and particularly to manufacturing, since this was the specific remit of the Management Research Forum. It is important to emphasise that arguments and insights offered in this report reflect many issues in common with other parts of the UK.

4.3 A Basic Framework for Organising the Report

Figure 1 shows the basic framework for organising the arguments made in the report. A three-part framework is adopted, examining business-university collaboration from the perspective of context, content and process (Pettigrew and Whipp, 1991).

4.3.1 The Context of Business-University Collaboration

In this report we argue that possibilities for collaboration between academics and business must be seen in the context of relevant and achievable outcomes, which take account of geographic, technological and financial characteristics and constraints. Businesses are more likely to engage with local universities where they have a need for sourcing new knowledge and where there is a strong but accessible science base in a relevant field. Recognising this we begin our discussion of business-university collaboration by reviewing the current Scottish landscape.

4.3.2 The Content of Business-University Collaboration

In this report we suggest that possibilities for collaboration must be seen in terms of the class of problem that needs to be addressed. SMEs (small and medium sized enterprises), for example, have a different scale of research needs to large firms and within the SME population high-tech firms may have very different problems to other firms. Some problems may be long term and require large-scale, in depth analysis. Others may be short term and involve relatively straightforward transfer of known solutions. What is clear is that SMEs should not be categorised as a homogenous group.

4.3.3 The Process of Business-University Collaboration

We argue first that collaboration between academics and business can take effect in a number of different ways and that the mode of collaboration must be appropriate to the class of problem. We then consider constraints on the process of collaboration, including the role of incentive structures, the impact of institutionalised values, differences in objectives and difficulties in communication between academics and practitioners.

4.3.4 Enhancing Business-University Collaboration

Building on this analysis we then apply institutional theory to consider how business-university collaboration could be made more effective.

Figure 1: The Context-Content-Process Framework for Assessing and Improving Business-University Collaboration
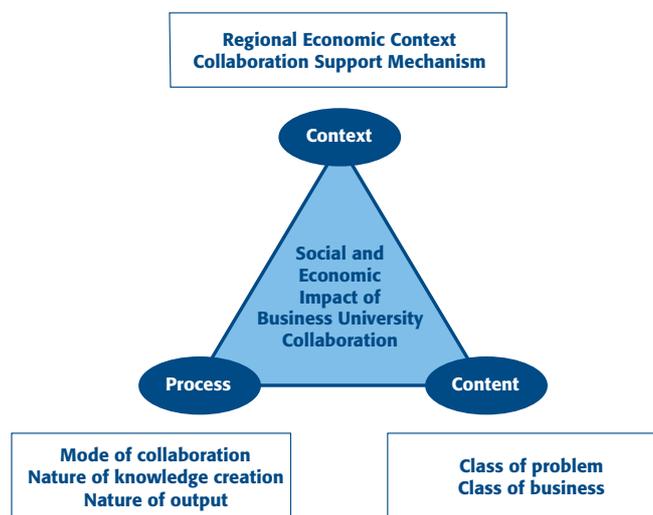
5 The Context of Business-University Collaboration in Scotland

In this report we discuss the context of business-university collaboration with specific reference to the Scottish landscape. Scotland is interesting because of its 'dilemma' of 'strong science-poor exploitation'. While outperforming the UK average in terms of university research output, Scotland does not appear to do particularly well in transforming public research into benefits for the Scottish economy.

5.1 The Scottish 'Dilemma'

5.1.1 Strong University Research Output

Various measures confirm Scotland's strong research output versus the UK average. In the last Research Assessment Exercise (RAE) in 2001, approximately 50% of Scottish Higher Education (HE) research was rated as internationally competitive (Scottish Executive, 2004). With just 9% of the UK population, Scotland in 2001 had 16% of all UK departments rated in the top three RAE categories and won 12% of the UK Funding Councils' resources for research, 13% of Government research funding and 12% of EU research resources spent in the UK (SHEFC, 2003). Scottish universities perform well in identifying potentially valuable innovations, outperforming on average US universities in terms of number of patent disclosures, licenses and spinout enterprises created (Scottish Executive, 2003a, p. 21).

5.1.2 Low Business R&D

Scotland underperforms in exploiting its strong public science base, as suggested by Sir Alan Langlands, Principal of Dundee University, "Scotland has a long and distinguished history of scientific discovery, innovation… and some of the world's leading scientists and engineers… but Scotland has not always been good at converting its research strengths into economic advantage" (Cambridge-MIT Institute, 2001). Scotland has a historically low level of business R&D investment and this low level may be in part to blame for Scotland's low productivity growth (Scottish Executive, 2003b). The use of existing government and EU mechanisms to support company R&D in Scotland is also identified as poor, partly as a result of the routine production processes carried out by many of Scotland's businesses (ITI Scotland 2004). It is recognised that R&D and productivity are closely associated and provide a measure of how effectively businesses exploit existing technology and develop new products and processes. Although approximately 600 enterprises undertake R&D in Scotland, over half of the expenditure is due to 26 large firms (i.e. those employing over 1,000 in the UK) (SHEFC, 2003). Of the top 10 publicly quoted companies in Scotland, five are either banks or utilities, suggesting that Scotland has too few major directly research-dependent industries (UK Parliament, 2001). Comparing Scottish 'spend' on R&D per employee with the rest of the UK reveals a sizeable gap of £248 versus £590 (Scottish Executive, 2003b). Figure 2 shows Scotland's business R&D expenditure of 0.53% of GDP in 2002, significantly below Germany or Finland, less than half of the UK percentage and less than a fifth of the UK's highest region.

Figure 2: Business R&D Investment as a Proportion (%) of GDP (2002)
(Source: European Commission 2003a, Scottish Executive 2003b)
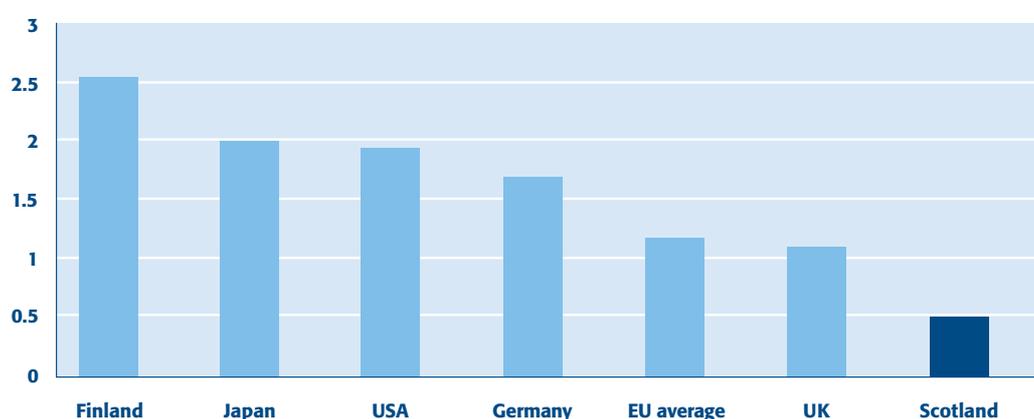
Contributing to Scotland's low R&D investment is the low level of R&D activity by large corporations and the high number of SMEs in Scotland (98% of businesses have less than 50 employees) that are not active in R&D (Scottish Executive, 2003b).

5.1.3 R&D Skills Shortage in Business

A related factor contributing to Scotland's poor R&D performance compared to the UK average is an identified skills shortage in R&D. Approximately 6,000 people work in R&D in enterprises in Scotland, 3,500 of them as scientists and engineers. R&D provides employment for 6% of all scientists and engineers in the Scottish labour market but well below the UK average of 13% (Scottish Executive, 2003b). Similar concerns have been raised regarding the fragility of business R&D in the UK as a whole, as it remains heavily dependent on the investment decisions of a dozen large companies, concentrated in two sectors: pharmaceuticals and defence (HM Treasury, 2004, p. 25).

5.1.4 Low Business Demand for Public Research

Related to low R&D activity is the low level of locally based SMEs and corporations capable of developing research findings being 'pushed' from universities, suggesting that Scotland does not lack "institutional push" but rather "industry pull". The need to stimulate research demand from businesses in Scotland and to improve engagement between public research and industry is well documented (Scottish Executive, 2000, 2001; UK Parliament, 2001). It is recognised that building Scotland's R&D culture and capability is both risky and expensive, particularly for the SME sector and is unlikely to be realised without significant public investment. The Federation of Small Business suggests that SMEs require a clear route to university research capacity where the service role of the public sector is fulfilled. This would allow SMEs wanting to innovate in process or product or to undertake research to benefit from university expertise. Further questions, which are explored later in this report, are whether or not university expertise is appropriate to the class of problem facing the SME and whether or not university expertise is readily accessible (Federation of Small Businesses In Scotland, 2002).

5.2 Support Mechanisms for Business-University Collaboration in Scotland

Scotland has multiple mechanisms that directly or indirectly support the commercial exploitation of public research and stimulate business-university collaboration. Figure 3 shows that government support is a critical element in strategies to exploit public research in Scotland. Scottish Enterprise (SE) is the primary national economic development agency[4] that operates an annual budget of £450m and focuses on three strategic themes: growing businesses, stimulating global connections and enhancing learning and skills. SE operates 12 local enterprise companies (LECs) that are responsible for generating objective performance outputs. In 2003/04, outputs include assisting 520 new product/service launches; assisting 100 successful business grant schemes and EU Framework programmes; assisting 30 successful applications to Proof of Concept; supporting 35 academic and company spinouts; and assisting 70 licences to be acquired by businesses in Scotland or granted to businesses within Scotland, among other objectives (Scottish Executive, 2004).

Technology transfer offices at each Scottish university are mandated to identify and exploit research results with commercial potential, with various SE programs available to Scottish universities on a competitive basis. The Proof of Concept Fund, launched in 1999, supports pre-commercialisation of leading-edge technologies from Scotland's universities, research institutes and NHS Trusts using a fund of £33 million over a six-year period.[5] The Royal Society of Edinburgh/Scottish Enterprise Fellowships programme provides support to 8-10 researchers per year from universities and research institutes to convert research ideas into viable commercial ventures. The Scottish Institute for Enterprise (SIE) supports entrepreneurship among science students at Scotland's universities as part of the wider £29m UK Enterprise Challenge to encourage transfer of science and technology innovation to the UK business sector.

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[4] Highlands and Islands Enterprise is the other national economic development agency.

[5] The Fund currently supports 120 projects worth £19m and is credited with creating 290 new jobs.

Figure 3: Elements of Scotland's Support Landscape for Public Research

(Public support mechanisms outlined in pale blue, private support outlined in dark blue and primary commercial actors highlighted in blue shade)
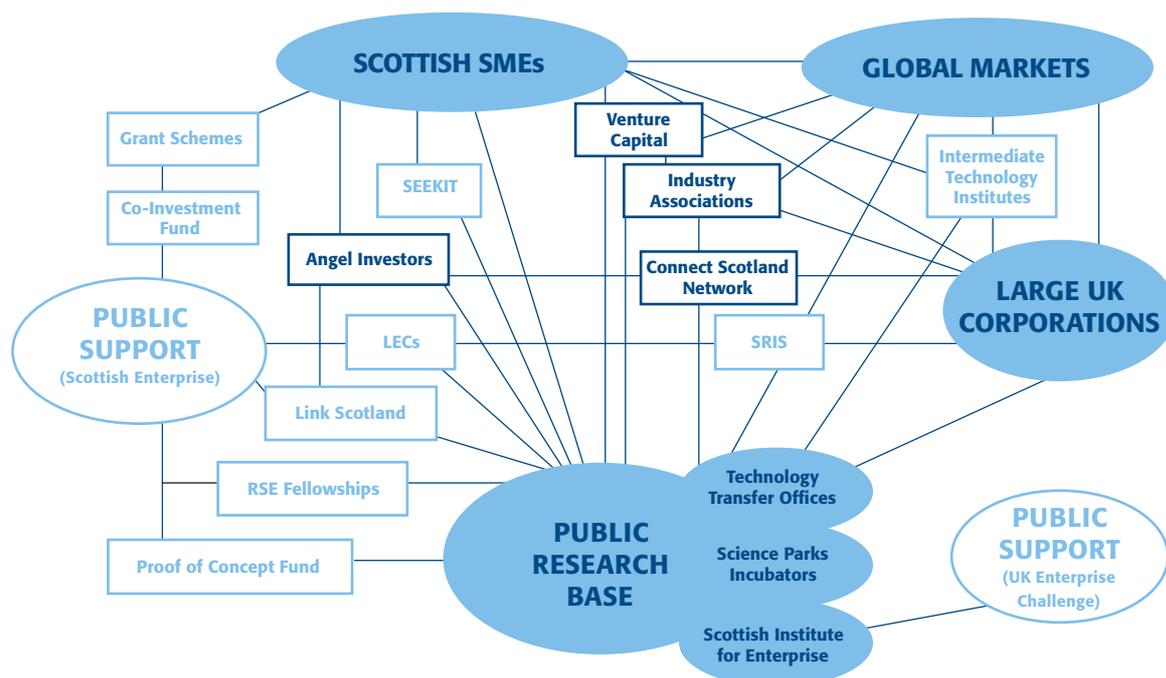
Various SE grant schemes, such as SMART, SPUR and SPURPLUS are targeted at existing Scottish companies to enhance their products and processes through new innovations and to stimulate collaboration with universities and research institutions.[6] Other funding sources include the Scottish Co-Investment Fund (SCF), a £20m fund recently launched by SE, financed by the Scottish Executive and designed to increase the amount of risk money invested in high growth start-up and early stage Scottish companies. In 2003/04 the SCF is expected to invest £6m in 25 companies. LINC Scotland is a national business introduction network focused on bringing together business angels willing to back new enterprises and SMEs using equity finance. A few larger venture capital firms and some smaller players remain active in Scotland, where typical investments range from £500,000 to £5 million but larger investment rounds of up to £20 million are possible.

A number of programmes are specifically focused on stimulating 'connections' between and among the primary commercial actors as shown in Figure 3. Scottish Enterprise provides the SEEKIT programme to support projects that will promote co-operation in R&D and knowledge transfer between SMEs and the Scottish public science base that includes universities, research institutes and NHS Trusts. Scottish Executive provides the Scottish Research Information System (SRIS) to bring together capabilities of universities and research institutes in Scotland and promote them to organisations in the global market to stimulate investment and collaboration (www.scottishresearch.com). Connect Scotland provides a private-public network of experienced entrepreneurs and business angels, business professionals, venture capitalists, aspiring entrepreneurs and entrepreneurial academics to build new technology businesses across Scotland. Eleven of Scotland's thirteen universities are Connect members.

Scottish Enterprise has recently created three Intermediary Technology Institutes (ITIs) for Life Sciences, Energy and Tech-media (covering communications technologies and digital media) to address the identified weakness of 'industry pull' for Scotland's research. With a budget of £450m over 10 years, the ITIs are expected to identify, commission and support the diffusion of market focused pre-competitive technology and tap into existing Scottish-based research capacities. The primary objectives are to increase the number of high growth companies in Scotland, improve the integration and exploitation of technology and increase the amount of R&D undertaken by Scottish-based companies.

[6] SMART provides up to £45,000, SPUR £50,000 to £130,000, SPURPLUS up to £450,000.

5.3 The Context of Business-University Collaboration in Scotland

The Scottish context appears to be one with the potential to benefit from more effective links between universities and business. While there is no shortage of support mechanisms in Scotland, identified concerns with Scotland's support landscape (as shown in Figure 3) include multiple points of entry, the level of complementarities among programs and over reliance on public support. An ongoing debate is whether the provision of this level of intermediary support and public spending is capable of improving Scotland's suggested poor performance in transforming public research into benefits for the Scottish economy and the need to consider other factors. Evidence from the Community Innovation Survey (DTI/ONS, 2001) found that UK small companies face greater difficulties than large firms in obtaining affordable finance for innovation activities (Stockdale, 2002b), but importantly, generate a higher percentage of their turnover from producing new or improved products (Stockdale, 2002a).

In the next two sections, we explore the possible constraints on such existing support mechanisms as shown in the Scottish context being able to provide the right kind of content and process to improve business-university collaboration. These content and context issues are not particular to the Scottish context and can be usefully placed in a wider discussion.

6 The Content of Business-University Collaboration

6.1 Classes of Problem in SMEs

Discussion at the AIM Management Research Forum highlighted the importance of recognising that there are various classes of problem, each requiring different types of relationship and/or services from universities. This applies particularly to the research needs and capabilities of SMEs, given their predominance in the economy.

Given the diversity of the UK SME base, clearly identified in the Scottish context, the success of public support programmes and initiatives depends on a sophisticated understanding of the diversity of SMEs' needs and capabilities for R&D. SMEs are often significantly constrained by time and resources and are less able than large firms to generate economies of scale from R&D investment. The problems they generate will depend on their industry, strategy and technological intensity. High-technology R&D intensive SMEs are most likely to perceive benefits from collaborating with universities, while low-technology SMEs and those with no R&D activity may have limited capacity to benefit from university knowledge spillovers (Cohen and Levinthal, 1990).

This suggests that if they engage with universities at all, SMEs that are not research active are likely to have a very different collaborative relationship with universities than R&D active firms. While some SMEs may benefit from more extensive and long-term collaboration with university expertise in solving technical 'R&D' problems, others might have a class of problems (such as relatively straightforward managerial issues) that are most effectively resolved using a short-term, low-cost project conducted, for example, as part of a student project (see panel on the Institute for Manufacturing at Cambridge). SMEs that require service- or process-based innovations or performance improvements are more likely to benefit from an academic partner who demonstrates 'commercial awareness' in assessing the class of problems and flexibility in working with the SME in what may represent a new form of market-driven rather than R&D-driven collaboration.

> *Professor Mike Gregory (Institute for Manufacturing at the University of Cambridge) presented a solution to the AIM Management Research Forum that links the education of the University of Cambridge students to research and practice using student-in-company project programmes (approximately 250 projects per annum). The students normally spend two weeks in a local company and tackle a real operational problem (informally considered a problem the Executive Manager cannot get around to), reporting the results of their investigations to the company at the end of the second week. In addition to the benefits to the firm and the students, this approach enables university staff to maintain and even enhance their relationships with industry and provides them with an understanding of current challenges facing businesses across the UK.*

6.2 Classes of Problem in Larger Firms

Larger firms also have varying needs and capabilities for R&D that are contingent on industry, sector and technological intensity. They have proportionately greater possibilities for generating economies of scale from R&D expenditure (Agrawal and Cockburn, 2003), although even for large R&D intensive firms such as British Aerospace, availability of resources for 'blue-sky' research is increasingly limited. Local collaborations with universities are likely to be driven by tight and specific objectives for the application of research outcomes, which may be at best only loosely aligned with the objectives of academic partners.

6.3 Access to the Regional Innovation System

Another class of problem identified by contributors to the Management Research Forum concerned the difficulties SMEs face in building relationships with large companies. This is further complicated by the difficulty that larger firms sometimes face in locating SME expertise. The presence of an 'anchor tenant' in the locality (a large R&D active firm with activities in a relevant technological domain) has been shown to increase significantly the ability of smaller innovative firms to benefit from university research (Agrawal and Cockburn, 2003). Business-university partnerships may provide an effective solution for SMEs to access the wider regional innovation system (see panel on the Fraunhofer-Gesellschaft in Germany).

A recognised international model that assists the development of a local regional network for local knowledge transfer is the Fraunhofer-Gesellschaft in Germany which maintains roughly 80 research units, including 58 Fraunhofer Institutes, at over 40 different locations (www.fhg.de). The Fraunhofer Institute of Innovation Services and Regional Development address the specific problems in innovation and business development of young SMEs as well as their interactions with the firm-related environment. Professor Bernd Michel discussed the networking activity of the Fraunhofer ISI with various universities, which have recognised competences in innovation research and locally based companies with each region focusing on one technology using the skill base of that region. The Fraunhofer ISI intensively networks with various universities. The scientists employed in the ISI have the opportunity to write a PhD/doctoral thesis or take sabbatical leave at any of the higher education institutions with which Fraunhofer ISI cooperates. The benefit is mutual. Fraunhofer ISI has direct access to the latest results of academic research through its close contacts with the universities. It gets to know the talented younger generation of scientists and the ISI scientists are able to pursue further academic qualifications (Annual Report 2000-2001).

6.4 The Content of Business-University Collaboration

Some classes of SME stand to accrue significant benefits from developing relationships with academic institutions, including enhanced awareness of existing university linkages, knowledge of the latest research practices, early identification of trends, identification of new student talent and the opportunity to access the skill base of the student population. While there is significant evidence that SMEs have the potential to gain from collaboration with universities, lack of understanding of the classes of problem faced by SMEs may:

*   Limit the ability of government to implement the most efficient policy drivers to reduce such obstacles (real and perceived); and

*   Restrict the capability of regional development agencies to implement Lambert's recommendations to facilitate business-university links.

Productive business-university collaboration depends critically on an adequate understanding of and differentiation between classes of problem. It also depends on putting in place effective modes of collaboration that are appropriate to the class of problem. We consider this further in the next section.

7 The Process of Business-University Collaboration

The previous sections identified the key 'players' of business-university collaboration and the support mechanisms intended to facilitate collaboration. It is clear that there is no shortage of programmes and initiatives intended to create opportunities for collaboration and that there are opportunities for business to gain from links with universities, if the mode of collaboration is appropriate to the class of problem.

The key challenge for business-university collaboration lies not only in ensuring that potential collaborators have the opportunity to make connections but also that the process of collaboration is effective. Nahapiet and Ghoshal's (1998) framework indicates that structural connections need to be supported by relational and cognitive connections. Much of the Lambert Review and indeed most policy documentation is written with the assumption that facilitating structural opportunities for collaboration will suffice. This section examines the difficulties and challenges inherent in business-university collaboration, focusing particularly on the university perspective.

Collaboration between business and academics can take effect in a number of different ways. Some emerge from informal network contacts between individuals, while others result from a formal approach to an institution. How collaboration occurs may be affected by the diversity of missions and objectives of academic departments and institutions. Student interns, or an academic acting as a consultant may most appropriately deal with some problems, with few or no academic outputs. Transfer of intellectual property (IP) through patents, licensing or spinouts may be appropriate in some cases. Other kinds of collaboration may involve a conventional (Mode 1) style of knowledge creation, with a linear, single-discipline focus generating academic as well as practitioner outcomes, or a more complex, non-linear trans-disciplinary process (Mode 2). Mode 2 is increasingly sought for in the current research environment (Harvey et al., 2002) and is suggested to be supportive of enquiry in highly differentiated and applied fields, such as management research (Tranfield and Starkey, 1998; Huff and Huff, 2001).

7.1 Facilitating Collaboration Through Networks

Networks are suggested to provide a mechanism to improve the process of knowledge transfer among different parties. (For a systematic review of literature in this area see Pittaway et al. (2004). A network has simply been defined as 'a firm's set of relationships with other organisations' (Perez and Sanchez, 2002). Bougrain and Haudeville (2002) identify two competing perspectives, the transaction cost view and the evolutionary theory perspective. The transaction cost standpoint views networks as a governance structure where division of labour is according to strengths of the stakeholder. The implications of this approach are that duplication of effort is avoided and there is minimum conflict and limited meetings. This is perhaps most consistent with Mode 1 knowledge creation. The evolutionary perspective takes a very different standpoint that focuses on the learning and discussion process. Here frequent meetings are required and there is a shared sense of purpose, which often results in a longer-term relationship. The latter model, closer to Mode 2, is typically the goal of university-industry collaboration.

As highlighted earlier in this report, businesses frequently do not have the funds to invest in research and development and, as a result, could draw on knowledge capital from universities through knowledge networks. The development of such networks, as stated earlier, can build on existing relationships. Starkey and Madan (2001) suggest four sources of these networks:

- Informal contacts and spinouts from university departments;
- Contract and collaborative research conducted by universities on behalf of industry (for example, through professional bodies);
- A result of property-led initiatives, for example science parks;
- Via the commercial exploitation of university research through management and licensing of intellectual property rights.

The mere existence of networks is not sufficient, however, as successful relationships must be built on trust, particularly if firms are to accept questioning of their modes of practice (Starkey and Madan, 2001). Successful collaboration tends to reflect a strong relational factor characterised by open-ended, flexible contracts that are of mutual benefit (Hoang and Antoncic, 2003). These relational concepts are frequently understated or absent given the reliance on a legal contractual arrangement culture in the UK (Nooteboom, 2000).

The discussion of trust speaks to a parallel literature on knowledge transfer that promotes the concept of communities of practice (Wenger, 1998). Wenger argues that information and ideas will flow only when there is trust between parties and also a shared understanding and language. In addition, both parties need to perceive that mutual engagement in the creation of intellectual capital will create value (Nahapiet and Ghoshal, 1998).

Much current policy making, particularly regarding the generation of 'clusters' and 'sector networks', is predicated on the basis that such initiatives will generate conditions conducive to collaboration (DTI, 2003). Due to the complex nature of networks, they frequently fail (Klijn, 1999), particularly where they are artificially created (Rychen and Zimmerman, 2002). We suggest that networks intended to facilitate collaboration between universities and business will be subject to a number of important constraints, due to:

- Academic incentive systems;
- Language differences;
- Differences in research objectives between academics and practitioners;
- Working to different time frames;
- Problems of finding the right people to talk to in universities.

7.2 Constraints Arising from Academic Incentive Systems

Competing demands on academics' time (between teaching, research and enterprise/outreach) and the extent to which incentives are geared towards research, are widely recognised. The current RAE system in the UK clearly constrains the motivation of academics to apportion greater time to 'enterprise' activities. Journals that are most highly rated in RAE terms tend to prize academic rigour over practitioner relevance. Given the significance of the RAE to both individuals and institutions in British Higher Education, academics have every incentive to focus on academic rigour in publications, often to the detriment of other activities. It could be argued that the RAE encourages academics to 'publish rather than patent' their inventions, reducing universities' scope for transferring knowledge through intellectual property.

Some research councils are now encouraging applicants to take account of user relevance and to engage in dissemination activities, although this is not necessarily a pre-requisite for obtaining funding and nor is co-funding a requirement. Due to its strong emphasis on pre-determined research questions and outcomes, the application process arguably still favours Mode 1 over Mode 2 styles of enquiry. Most university promotion panels base decisions on research excellence, which is evaluated on the basis of publications and research council funding, further reinforcing the perceived importance of traditional academic research over other activities.

There exists in British Higher Education a system that generates powerful incentives for academics to focus on traditional academic research and no real incentives to engage in external collaboration. To paraphrase the words of Steven Kerr (1975), we are clearly in a situation where we are rewarding academic rigour while hoping for practical relevance. A further disincentive resides at the institutional level, where a lack of clarity regarding the ownership of intellectual property acts as a disincentive to using that route for knowledge transfer (Lambert, 2003).

Despite the current academic incentive system, a few universities are broadening their role in the wider economic and social agenda (beyond research and teaching) and embracing business-university collaboration. Shattock (2003) suggests that some UK universities, like businesses, are creating internal organisational structures that are sufficiently flexible to respond to external change and embrace new opportunities. While many universities continue to isolate past achievement, future success and organisational capability within the existing incentive system, others are re-evaluating and revising their strategies, broadening definitions of institutional 'success' and embracing new organisational structures (Ghoshal and Bartlett, 1993; Shattock, 2003).

Business-university collaboration continues to rise in the United States, for example, despite the existence of a competitive research-driven culture. Engagement with industry by universities is motivated by decreasing levels of government funding and the need to generate new funds for research assistance, lab equipment and furthering individual academic and departmental research agendas (Hall et al., 2000). Engagement with industry by universities is also motivated by the Bayh-Doyle Act (1980).[7] Under the Act, US universities retain title of their intellectual property (IP) but must licence it to industrial partners that further develop the IP for the market.

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[7] Bayh-Dole Act (35 USC 200-212).

7.3 Constraints Arising from Differences in Objectives

Constraints to collaboration between universities and industry can arise not only from differences in incentives for collaboration, as suggested above, but also from the different perceptions in the value of research outcomes between academics and business, as reflected in the language used. Researchers focus on theoretically driven questions that interest them and that they believe will be of interest to their academic peers, while practitioners often want to solve problems in a pragmatic way and look for prescriptive answers rather than reflexive analysis. The differences in the language used by academics and practitioners extend beyond terminology to the underlying concepts used to define problems and identify potential opportunities as a starting point for collaboration. The Industry-Academic Links report (HEFCE, 1998) suggests there are three principal problems of knowledge flow:

• Practitioners believe that research can be of benefit to them but do not view research topics, as defined in universities, as of relevance;

• In terms of management research, practitioners do not feel that research contributes directly to their managerial role;

• Firms lack awareness of the results of the research and also researchers lack a systematic and effective method of dissemination.

In considering business-university collaboration, it may be counter-productive for parties to assume that there is a trade-off between relevance and academic rigour. Many eminent academics contend that academic rigour and practical relevance are mutually reinforcing (e.g. Schendel, 1991; Mowday, 1997). In support of their arguments, a forthcoming review of publications in the most cited management journals found a correlation between academic quality (rated by academics) and practical relevance (rated by practitioners) (Baldridge et al., 2004). If differences in objectives between business and academics are to be overcome and if more academics are to leap the double hurdles of quality and relevance identified by Pettigrew (1997), the most effective route may be to conceptualise rigour partly in terms of relevance, as we suggest later in this report.

7.4 Constraints Arising from Locating Expertise

Traditional organisational structures of universities, as noted earlier, may not facilitate easy access to those places where appropriate knowledge resides. The organisation of research centres within universities (often done for institutional reasons that make sense internally but may have no coherence to those outside) makes it difficult to identify either the location of knowledge within a university or its focus, depth and quality. For large research universities, various levels of separation may exist between access to knowledge sources and the university contact point for external queries. Knowledge management systems, set up by university technology transfer offices and business development teams, may go some way toward addressing the lack of knowledge transparency and accessibility of information.

There remain significant institutional constraints to business-university collaboration, which stem from institutionalised values and practices that have deep roots in the current Higher Education system. In the next section we consider how these issues might be addressed.

8 Enhancing Business-University Collaboration

The move towards a knowledge economy has been well documented in both academic and practitioner literature and has virtually become a facet of current management orthodoxy (May et al., 2002). Accordingly, knowledge and intellectual capital has become central to organisations' strategies for competitive advantage (Flood et al., 2001). Universities have long been recognised as a significant repository of knowledge and, perhaps more importantly, a location for knowledge creation. The establishment of an effective interface and flow of knowledge between universities and business is significant for the UK economy as a whole and particularly in the Scottish context.

As highlighted earlier in this report, there are a number of issues associated with making this interface effective. One is the low R&D capability in many SMEs, making it difficult for them to absorb knowledge spillovers from external sources, although a considerable range of regional support mechanisms are now in place. Another issue is the diversity of 'class of problem' faced by business, with some problems requiring new collaborative forms and transfer of intellectual capital, while others are more simply addressed through the transfer of known solutions. A third issue is the traditional divide between academics' and practitioners' perceptions of the research process and its objectives, with incentive structures in universities still geared towards academic quality and rigour, while practitioners have to find solutions to specific organisation-based problems. There has been some bridging of this divide; with academics increasingly recognising the value of Mode 2, action-learning methods but collaboration is still hindered by issues of communication and accessibility.

In this section we consider how we can move forward toward more effective integration between universities and business. To make this case we refer to various concepts from institutional theory (Scott, 2001). The merit of the institutional approach for this purpose is that it focuses on the objectified and taken-for-granted nature of organisations and organisational environments and it emphasises the role of institutionalised values in shaping and legitimising the actions and interactions of both organisations and the individuals within them (Aldrich, 1999). Institutional constraints provide the framework within which human interaction takes place (North, 1990).

"Institutions are composed of cultural-cognitive, normative and regulative elements that, together with associated activities and resources, provide meaning to social life" (Scott, 2001: 48). In our discussion, we suggest that the process of change needs to address all three of these elements:

- **_Normative element._** 'Norms' specify how things should be done and convey social expectations about appropriate and valued behaviour and mutual obligation (Scott, 2001). Are there models of business university interaction for academics, practitioners and support partners to learn from or imitate and can these models be promoted by relevant professional bodies?

- **_Cultural-cognitive element._** Cultural parameters signal acceptable modes of interaction for the definition, classification, negotiation and resolution of social interests (Douglas, 1986). With this in mind, how can increased communication and networking between different stakeholders in business-university collaboration be achieved?

- **_Regulative element._** A system of rules and laws, backed by sanctioning power, lies at the heart of any institutional system (North, 1990). What regulative changes can support and underpin improvements in university-business collaboration?

8.1 Normative Change: What Models are Available to Learn from or Imitate?

The normative element of institutional theory acknowledges the prescriptive, evaluative and obligatory dimension of social life, expressed in both values and norms (Scott, 2001). Values are conceptions of the preferred and desirable, prescribing standards against which behaviour can be compared. Norms specify how things should be done, by defining legitimate means to pursuing valued ends. These, in turn, give rise to conceptions of appropriate goals or activities for particular individuals in given social positions.

In the context of business-university interaction, it seems clear from the preceding discussion that academics tend to have a particular set of conceptions about desirable outcomes (recognition as a erudite scholar who contributes to the advancement of knowledge) and the means to achieve those outcomes (through publication in journals that are widely respected by peers). These values are socialised and reinforced in the occupational socialisation of doctoral students and junior faculty, to the extent that, for many academics they are more salient than personal financial incentives. These conceptions are not specific to the UK (see for example Kerr, 1975) although undoubtedly the RAE reinforces their significance here.

Arguably, these conceptions permeate not only academic institutions themselves but also external institutions, including for example managers in SMEs or larger firms who may endorse a fairly dismissive view of what an academic institution has to offer to the wider business environment. Normative conceptions of the role of business in the economy, particularly in the for-profit sector, are also important, in that they determine how owners, managers and entrepreneurs think they should conduct themselves. Research conducted amongst senior executives in large firms suggests that they see themselves as reliant to a large extent on their prior experience for insights about how to act and are relatively closed to external sources of ideas (Guest et al., 2001).

If business-university collaboration is to become a more widely exploited source of knowledge creation, these conceptions need to change, both within and beyond the universities. To some extent, consultative documents such as the Lambert Review serve this end, by expressing the value of collaboration and by identifying models of good practice that might be productively replicated elsewhere.

To this end, we add to the models identified by Lambert, some additional models of university-industry collaboration that were identified by the Management Research Forum. This includes the Fraunhofer-Gesellschaft in Germany (see earlier panel) and the Swedish research and development institution Fenix (see panel below).

A successful model of collaboration between universities and industry is Fenix. Fenix was formed in 1997 and is a Swedish research and development institution that binds research and practice. It draws on funding from research foundations, universities and industry and aims to explore contemporary important managerial issues in research and development through the action-learning model. Their research is divided into five research groups:

1. *Managing Intellectual Capital and Innovation*

2. *Business Creation and Entrepreneurship*

3. *Modern Organizing*

4. *Knowledge for Development*

5. *Market Driven Change*

The projects are theoretically driven and partner organisations are fundamental to the development process. Fenix has four national partner institutions: Chalmers University of Technology; Hogskolan I Halmstad; Jonkoping International Business School and Stockholm School of Economics. Relationships also exist with four international universities: California Polytechnic State University; Ecoles de Mines de Paris; Polytechnico de Milano and University of California, San Diego. Industry partnerships are also vital in the development and experimental process and Fenix are currently working with AstraZeneca, Ericsson, Telia and Volvo Car Cooperation.

Collaboration with both academic and industry partners has been vital to defining, developing and implementing their five research areas. These associations have also benefited education programmes such as the Fenix Executive PhD programme. During the programme executives explore mechanisms of integrating academia and practice in order to achieve knowledge generation that enables business opportunities. For further details see www.fenix.chalmers.se/fenix and Starkey and Madan (2001).

UK initiatives, such as the recently launched Scottish ITIs, may well provide some of the features and benefits as identified in the Fenix model in the future if successful. Professional bodies also have a role to play in the dissemination of academic research into practice and we offer an example of the Chartered Institute of Personnel and Development (see panel opposite).

The Chartered Institute of Personnel Development (CIPD) is an excellent example of a professional body that is committed to integrating research and practice. The CIPD aims to promote good practice in the field of human resource management. The organisation is committed to ensuring 'knowledge into action and research in practice'. Research is commissioned in order to keep members up to date with leading edge knowledge and in order to understand emerging themes and trends in the field. Research findings are subsequently converted into practical, relevant materials and tools. Research areas include the examination of changing psychological contract and employment relationship. Reports have been generated each year between 1996-2003 and therefore track trends over time. A practical tool for measuring the state of the psychological contract has been generated and aids diagnosis and policy intervention.

Knowledge transfer between universities and practitioners is also facilitated by 'Knowledge into Practice'. Annual events are scheduled whereby academics showcase their research and highlight important topics in the field of human resource management, which stimulates subsequent discussion. In this forum practitioners can gain a lot of information regarding key issues and academics acquire further knowledge about practices in the field. For more information see www.cipd.co.uk

It is important to recognise, following institutional theory, the complexity and subtlety of social systems. Varying competing institutions are at work, operating at all levels of the system, from government departments and bodies, through universities' administration down to individual departments and research centres. The potential impact of a normative approach to effecting change through the dissemination of models of good practice must be seen in this light. There is limited scope for change using a normative approach alone.

8.2 Cultural Change: How Can Increased Communication and Networking Between Different Stakeholders be Achieved?

The cultural element of institutional theory acknowledges the power of shared cultural norms and symbolic systems as a basis for organising (Knorr-Certina, 1999). Individuals and organisations (such as universities and firms) follow preordained acceptable patterns and behaviours for communication and interaction, which are derived by the 'community of practice' in which they operate (Douglas, 1986; Wenger, 1998).

We have already highlighted a number of cultural elements that are fundamental if knowledge flows between business and universities are to be effective. These include the existence of trust based relationships and perceptions of mutual benefit and added value (Hoang and Antoncic, 2003; Nahapiet and Ghoshal, 1998). Effective collaborations are likely to be those where the various parties share a common perception of the problem, agree on the appropriate route to the solution (including timescales and the kinds of data collected or experiments conducted), the likely shape of the solution (an academic paper or a practitioner report) and the likely outcomes (ownership of intellectual property). Academics and practitioners need to work towards establishing a common language for negotiating the meaning and expectations of the research process, so that both parties can work toward satisfactory outcomes.

This is a critical challenge for effective business-university collaboration. A study of academics' and managers' conceptions of what constitutes organisational effectiveness found considering differences in underlying value systems (Walton and Dawson, 2001). Some argue that academics and practitioners hold irreconcilably different views about what constitutes academic quality and relevance (Shrivastava and Mitroff, 1984). Given the often ambiguous and unpredictable nature of managerial work, solutions offering concrete examples, that are relevant to the industry or sector in question, appear to be more attractive to practitioners than those requiring extrapolation from an alien context, (Huczynski, 1993). Starkey and Madan (2001) note that organisations need to think about the benefits from working with researchers and researchers need to understand the needs of industry and to write and communicate in a more accessible manner. If academic research is to be relevant to practitioners it needs to meet the following criteria suggested by Thomas and Tymon (1982):

- *Descriptive relevance –* accuracy of research findings in capturing phenomena encountered by practitioners;
- *Goal relevance –* correspondence of outcome variables in a theory to the things practitioners wish to influence;
- *Operational validity –* the ability of the practitioner to implement action implications of a theory by manipulating its causal variables;
- *Non-obviousness –* the degree to which a theory meets or exceeds the complexity of common sense theory already used by a practitioner;
- *Timeliness –* the requirement that a theory be available to practitioners in time to use it to deal with problems.

One solution is to create opportunities for academics and external partners to meet through network initiatives. We have noted many of the initiatives aimed toward this in the Scottish context, such as Connect, LINC and SRIS. Although research suggests that artificially created networks often fail (Rychen and Zimmerman, 2002), it is clear that we need to find ways to improve the relational and cognitive elements of social capital connections, as well as the structural elements.

Critical to collaboration is perception of mutual gain and one way to address the issue of communication of objectives is to incentivise academics to articulate their research objectives in terms of user relevance and to make public research funding conditional on this. The Research Councils are moving in this direction, as we noted earlier. Another possible solution is to promote sources of funding which require co-funding from business, such as the approach adopted by the Marketing Science Institute Forum (see panel). It must be noted, however, that such initiatives are only likely to be successful where demand from business for collaboration exists, so this cannot be seen as a full solution to the demand problems identified in the Lambert Review.

> *The Marketing Science Institute Forum brings both rigor and relevance and has 2,000 executives in 60 global companies and 2,000 academic researchers in marketing, organisational behaviour, information systems and other fields. It establishes a research agenda and then provides funding for research projects related to that agenda. Every two years the research agenda is identified through discussion around the world, culminating in a ballot of members. Research results are published and disseminated quickly to members through print publications and a website (Starkey and Madan, 2001).*
>
> *Founded in 1961 as a not-for-profit organization, the Marketing Science Institute follows the clear mission "to bring together marketing scholars and executives in order to improve business performance through the development of rigorous and relevant knowledge" (www.msi.org). Bill Starbuck (2004) judges this approach as delivering "better questions, better analysis before gathering data, better data, and better analysis of implications".*

Another solution would be to promote technology transfer offices as knowledge brokers and 'translators of research', or draw on intermediaries such as trade associations to facilitate communication. Technology transfer offices and research and enterprise departments would benefit from a greater availability of data to locate sources of knowledge within the institutions they promote. They also need support in terms of incentivising academics to deliver on knowledge transfer, an issue we address below.

It is evident that mechanisms to embed networks are vital for enduring relationships. A fundamental problem occurs if networks are contingent on a few key individuals. Whatever the mechanism, Kickert and Koppenjan (1999) have argued that joint problem solving, cooperation and consensus building are necessary conditions for effective network management to occur. This is only likely to be achieved through changes to the incentive systems in which academics operate and also where personal attributes for networking are present (such as effective interpersonal, listening skills, dispute resolution and the ability to persuade; Goodwin, 2000).

To further stimulate incentives for collaboration, processes by which intellectual property (IP) is created and owned by individual academics, universities and business should be made as clear, transparent and fair as possible and effective management of IP should be integrated with other university policies in order to achieve consistency (AURIL, UUK and Great Britain Patent Office, 2002). UK universities, unlike their US public-sector counterparts, do not have a legal

obligation to licence IP or collaborate with business. UK collaboration may be more motivated by maximising financial contributions from IP to contribute to central university funding and to sustain research teams in order to publish results of scientific significance. Universities in the UK are rather 'strongly encouraged' by regional and national policy-makers and by the European Commission to engage in collaborative research with business and to exploit IP (European Commission, 2003b). Without a legislative 'push' for UK universities to engage with business, it can be argued that universities offering clear, realistic and fair terms for IP creation and ownership will provide a 'pull' to business and an incentive rather than disincentive for exploring new collaborative opportunities. Similarly, without clear and fair terms to incentivise those academics or business colleagues generating IP, collaboration may be unsuccessful.

8.3 Regulative Change: What Institutional Changes Can Back Up and Underpin These Changes?

The regulative element of institutional theory acknowledges that a systems of rules, both informal and formal, lie at the heart of an institutional system. These rules sanction appropriate behaviour through coercive mechanisms and through the selective allocation of resources.

In the context of business-university collaboration, the RAE and research funding systems operate as strong regulative mechanisms. Academics whose work does not perform within the 'rules of the RAE game' are implicitly not valued and often struggle to obtain recognition or promotion. It is not only 'enterprise' activities that suffer from this; teaching has long been recognised as subordinate to research priorities (Kerr, 1975).

Regulative changes are therefore vital in order to facilitate effective business-university collaboration. New incentive structures, such as changed funding criteria and revised criteria for promotions, are required in order to incentivise academics to meet the 'double hurdle' of rigour and relevance (Pettigrew, 1997) and if applied research is to increase in prestige in the academic community. Recognising the issue, the Scottish Higher Education Funding Council in its consultation document, Research and the Knowledge Age (2000), discussed the need for greater relevance in research. Criteria suggested for assessing relevance were:

- Looking further afield for sources of research questions than within the immediate academic community;
- Consideration of the role that research outcomes will have in society;
- Securing agreements for external funding.

The question of relevance is an enduring one within the management literature and is a common focus for Presidential addresses to the Academy of Management. It seems that changes in Research Council criteria to introduce user relevance are under way in Scotland and elsewhere. If the government is serious about implementing Lambert's recommendations and taking bold steps to address the collaboration gap, we think that the RAE also needs to be changed to assess units of analysis not only on academic excellence but also to incorporate an assessment of practitioner relevance. We suggest that this could be achieved in two ways:

- By incorporating some of the measures adopted by the Association of University Research and Industry Links (AURIL) and the UK University Companies Association (UNICO) in their assessments of business-university collaboration (including IP licensing and spinouts, consultancy, Knowledge Transfer Partnerships, student projects etc.) into a measure of practitioner relevance;
- In the Business and Management field, by rating academic journals not only on their academic standing and citations, but also on their practitioner relevance (this could be determined by the proportion of readership who are practitioners). For example, publications in the Academy of Management Executive, the Harvard Business Review and the Human Resource Management Journal would score highly on this measure.

The feasibility of this approach, in particular for subjects across the full range of academic disciplines, is still to be determined. Many participants at the Management Research Forum, both academics and non-academics, endorsed this idea and wish to encourage the RAE panels to consider it.
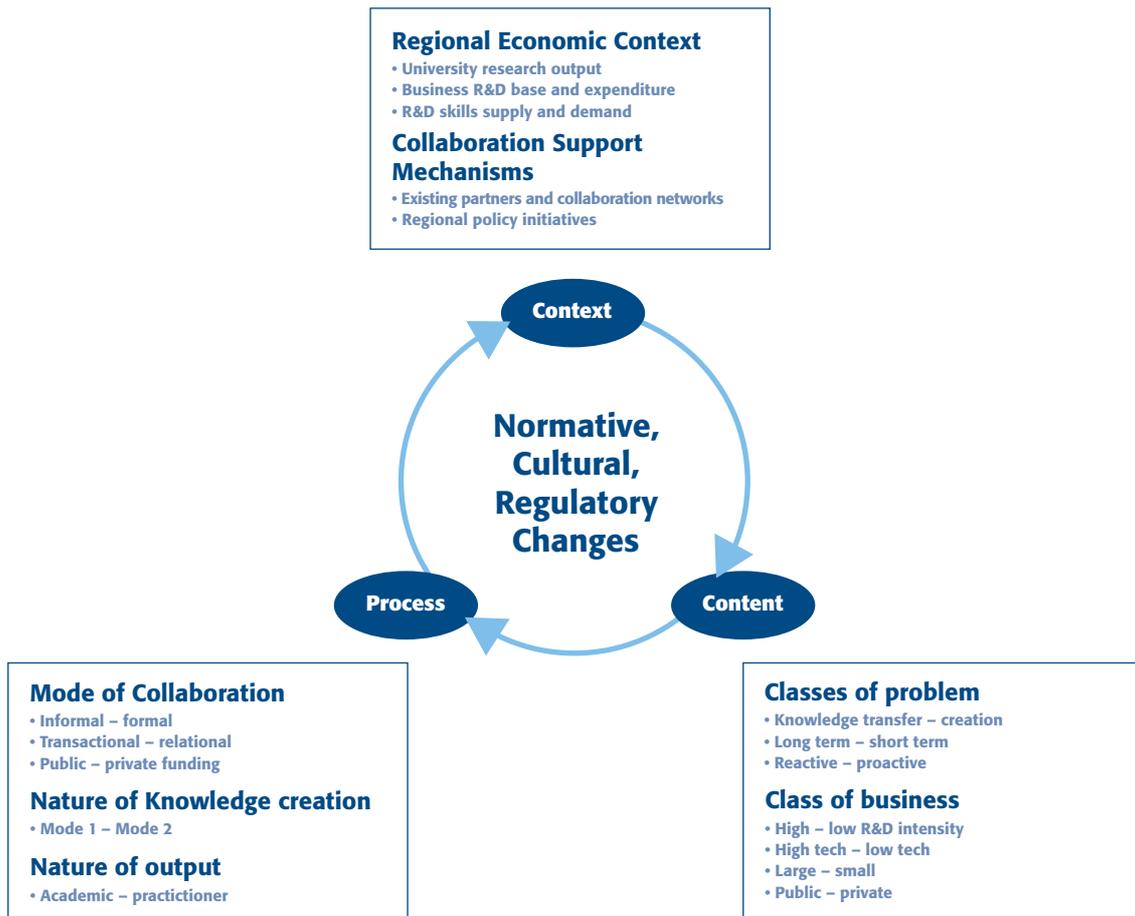
9 Conclusions and Recommendations

In this document we have tried to convey the idea that, to assess and improve business-university collaboration in the UK, we need to move beyond the neat picture presented by policy-makers and engage with the messy, complex and interconnected nature of social systems.

We summarise our discussion in the following figure:

Figure 4: A Summary of the Ideas Presented in this Report

Regional Economic Context
• University research output
• Business R&D base and expenditure
• R&D skills supply and demand

Collaboration Support Mechanisms
• Existing partners and collaboration networks
• Regional policy initiatives

Context

Normative, Cultural, Regulatory Changes

Process

Content

Mode of Collaboration
• Informal – formal
• Transactional – relational
• Public – private funding

Nature of Knowledge creation
• Mode 1 – Mode 2

Nature of output
• Academic – practitioner

Classes of problem
• Knowledge transfer – creation
• Long term – short term
• Reactive – proactive

Class of business
• High – low R&D intensity
• High tech – low tech
• Large – small
• Public – private

On the basis of the discussion on the previous pages, we set out the following recommendations for policy:

9.1 Policy Recommendations

Take account of the context

Policy for business-university collaboration must take account of the industrial context and existing supportive landscape. This should include recognition of the diversity of collaboration requirements within and between large and small firms given firm and industry characteristics, the need for appropriate and accessible financial and commercial support and the effectiveness of existing support mechanisms.

Take account of classes of problem

Policy must take account of different classes of problem within businesses. Some may require collaboration with academics to generate new knowledge, while others are more straightforwardly addressed through the transfer of existing knowledge.

Provide appropriate incentives

To initiate collaboration all parties must believe that there will be appropriate mutual gain and financial outcomes. The structure of financial and other incentives has to recognise that there are multiple stakeholders in any collaboration, including the business, university central administration and the individual academic(s).

Improve communication between business and universities

A significant problem for business is to understand what universities can offer them. Methods for improving communications are required. Universities should make more effort to clarify and communicate their specific strengths and areas of expertise.

Enhance the use of relevance criteria in the RAE

Improve the assessment of the practitioner relevance of research in the Research Assessment Exercise (RAE), either by using measures of knowledge transfer activities or by assessing the practitioner impact of journals. Even if this assessment were not used to determine funding levels, it would help external parties locate relevant knowledge within individual departments.

Extend the use of relevance criteria in Funding Council decisions

Funding Councils are beginning to focus on user relevance but this is still seen as less important than academic rigour. Research Councils should seek to redefine 'quality of science' giving a more balanced weighting to both rigour and relevance.

Change promotion criteria within universities

It should be possible to be promoted on the basis of enterprise and outreach activities, alongside research. Therefore, promotion panels should be encouraged to broaden the definition of academic excellence to include outputs with clear practitioner relevance.

Improve clarity, transparency and fairness of the IP process

Processes for the creation and ownership of intellectual property among individual academics, universities and business should be clear, transparent and realistic to incentivise collaboration.

9.2 Research Recommendations

The insights from the Management Research Forum and subsequent discussions indicate that there is a need for further analysis. We suggest the following topics:

Develop social network maps of regional business-university collaborations

In order to gain a more complete understanding of how knowledge transfer works and the capability of the various agencies to support it, we need a more detailed understanding of the relationships between key players in the regional economy. This could be achieved through a regional social network analysis, focusing on the use of university-based knowledge by business as a dependent variable.

Undertake international comparison of models of business-university collaboration

We still have much to learn from models of effective practice in other countries and the path dependent factors that determine whether and why these models are effective. Such research should also examine how these models might be applied in the UK context.

Investigate the R&D needs and capabilities of SMEs

In order to understand how the research base might be useful to SMEs, we need to identify the different classes of problem they face that might benefit from sourcing knowledge externally.

Identify and examine methods for assessing research relevance

One of our policy recommendations suggests incorporating measures of practitioner relevance into the RAE. We need, however, to be sure that the measures adopted are valid and that they do not overestimate certain types of engagement or neglect others.

Qualify the economic value of collaboration

Much of this report has been written as if the economic value of collaboration between business and universities is not in doubt. We need to know more about the extent to which collaboration with universities increases the productivity of firms. Understanding this would provide valuable insight into the extent to which support for collaboration should be funded.

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Notes

AIM Research – The Challenge of Business-University Collaboration