

## **From Transactions to Partnerships in Innovation Systems: A Triple Helix Perspective**

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**Abstract**

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Policy makers in developed and less developed nations are now fully aware that research and tertiary education is essential to building the knowledge base and human capital on which the modern economy is based.

In this environment effective interactions between industry, government and academic institutions can create powerful relationships that deliver substantial benefits in knowledge transfer, translation and application in business and public policy contexts.

Recent research and observed practice has pointed to the important role of intermediaries—people who work at the interface between institutions—and leaders, in bringing institutions together around a common purpose or mission.

Using the Triple Helix framework, this paper outlines the role of intermediaries and leaders in improving the ‘circulatory flow’ of ideas and knowledge in innovation systems.

The paper also points to the way in which intermediaries, in an engagement capacity, can assist governments and universities transition from short term transaction modes of interaction to longer term partnership relationships.

In Australia partnership relationships have become particularly important in the context of the Global Financial Crisis as the Government sees infrastructure investment in universities as a key plank in its fiscal stimulus strategy.

**Keywords:** Intermediaries, institutions for engagement, innovation.

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## 1 Introduction

The theme of the paper concerns the difficulties and challenges in moving from transactions- based relationships between higher education, business and government to one of genuine partnership.

In their background paper for this conference Dzisak and Etzkowitz submit that Triple Helix Interactions may be likened to the circulatory flow of blood through the “arteries” of an innovation system. They argue that:

In different innovation systems, reducing the blockages to interaction enhances the movement within and across institutional spheres, clearing the path to sustainable development (Dzisak and Etzkowitz 2009).

This paper picks up and develops this concept by looking at the role of intermediaries and partnerships in reducing blockages in the transfer, translation and application of knowledge in regional innovation systems.

## 2 Interactions and institutions for engagement

Academic literature and practice point to the important role of *institutions of engagement* in innovation systems (Howard 2004a, 2004b). These institutions operate at the interface between higher education institutions (with missions relating to teaching, research and outreach), government departments and agencies (with missions relating to efficient and effective program delivery), and profit and not-for-profit businesses (with missions relating to meeting the needs of customers).

Institutions of engagement fall into three broad institutional categories

- Knowledge communities—where knowledge is shared through networks, exchanges and communities of practice. Social networking, open source, and Web 2.0 technologies support this institutional form.
- Knowledge markets—where knowledge is traded, in the form of intellectual property rights, customised teaching programs, consultancy, and extension, through University technology transfer offices.
- Knowledge organisations—where knowledge is created in cooperative and collaborative organisations such as cooperative research and teaching centres and institutes. The Australian Cooperative Research Centre (CRC) is a much cited example of this institutional form.

In the Triple Helix and biological analogy, the role of these institutions is to enhance the ‘circulatory flow’ of interactions between the key organs of the innovation system. Dzisak and Etzkowitz define the circulatory concept in terms of *people, ideas* and *innovations*. (Dzisak and Etzkowitz 2009). Using examples and evidence this concept provides quite a powerful normative model of interactions.

But the biological model has limitations: innovation systems with similar endowments of knowledge capital and capability may perform quite differently in terms of innovation outcomes. Drawing on recent studies, differentiating factors relate to the *quantity* and the *quality* of interactions, the strength of *leadership*, and the level of *trust* established between the parties through long term partnership arrangements (Howard 2007c, 2007b). Innovation intermediaries and business, academic and community leaders are critical differentiating agents.

Innovation intermediaries enhance the quantity and quality of interactions by increasing efficiency (such as reduced cycle time and reduced transactions costs) and improve quality through improved stakeholder satisfaction. Leaders perform a role in bringing institutions together around a longer term vision and mission for innovation—generally involving commitment to a portfolio of programs and projects. (Walshok et al. 2002; Henton et al. 1997).

In economists’ terms, intermediaries and leaders address market and institutional failures by linking creators and users of knowledge; they build a foundation for interactions among the institutions for engagement around longer term relationships. From another paradigm, intermediaries facilitate the external sourcing of innovation under the model of open innovation systems (Chesbrough 2003; European Commission 2007; Linder et al. 2003; Quinn 2002).

Developing genuine partnership arrangements is perhaps the most challenging in achieving engagement outcomes. Governments and accountability agencies (Treasuries, Auditors-General, and Parliamentary Committees) see open ended innovation partnership arrangements as containing high

elements of unacceptable risk. In Australia, there has been a discernable trend towards market-based transactional relationships, based on purchaser-provider models and procurement contracts. This makes the development of long term trust based collaborations and joint ventures between sectors somewhat problematic.

The paradox is, however, that policy makers, particularly in areas of climate change, water management, energy, and social inclusion, are looking to universities and research organisations for the evidence base for new program design and policy initiatives. This requirement for 'evidenced based policy' involves developing closer relationships between government and universities on the basis of partnership and new forms of engagement relationship where both research excellence and policy relevance are accorded high priority (Howard 2008).

### **3 Differentiating innovation performance**

#### **3.1 Intermediaries: enhancing the quality of Interactions**

Notwithstanding the increasing sophistication of the institutions for engagement, there are still significant gaps and blockages to knowledge transfer, translation and application. Intermediary organisations have been identified as a means to enhance the quality, reduce the cost and enhance the performance of interactions. There have been several studies of the role of intermediaries in innovation systems and the contribution of intermediary organisations (Howells 2006; Dodgson and Bessant 1996). Several countries have launched specific intermediary programs.

Intermediaries are third parties that play an integral part in the facilitation of interactions and building relationships between institutions in the innovation system. Intermediary activities cover four quite distinct roles:

- That of a *consultant*—covering assistance in the recognition, acquisition and utilisation of relevant intellectual property or technology and identifying potential collaborators as well as identifying and tailoring advice.
- That of a *broker*—covering brokering a transaction between two or more parties.
- That of a *mediator*—covering acting as a mediator, or go-between, with bodies or organisations that are already collaborating.
- That of a *resource provider*—covering funding and support for the innovation outcomes of such collaborations.

Each role has different characteristics in terms of knowledge and skills, responsibilities and accountabilities, rules of professional and ethical conduct, incentives, rewards, and remuneration. These roles are provided by people separately, in specialist organisations, or in combination.

Recent studies undertaken for Australian and State Governments and for business on the way in which intermediaries support the institutions for engagement by overcoming gaps and blockages in the 'circulatory system' of innovation has been well documented (Matthews and Howard 2006; Howard 2005, 2007a, 2007b, 2007c; Howard and Matthews 2001; Howard and Howard 2001; Howard 2004c, 2006). Findings from these studies are outlined below.

**(i) Information gaps**—gaps that arise due to difficulties encountered by businesses and government agencies in identifying relevant, useful, and applicable technologies/knowledge. The cost of search can be resource and time intensive and beyond the capacity and capability of new and emerging businesses. Intermediaries support information search through interpretation and analysis of electronic and other databases (in the case of explicit knowledge) as well as providing support and assistance in finding people with sought after skills and experience (in the case of tacit and contextual knowledge).

**(ii) Access gaps**—firms might find it difficult to access technologies/knowledge even when they know where to find it. Working through a research organisation or corporate bureaucracy to find the person who has the authority and accountability to make a decision can also be time and resource intensive. Even where an access point is identified, it may be necessary for business to establish credibility and *bona fides* about the way in which the knowledge/technology is to be used. Technology/knowledge suppliers may rely on an intermediary to attest to the integrity of a new and emerging businesses.

(iii) **Transfer gaps**—Negotiation of knowledge/technology transfer, including license agreements and memoranda relating to collaboration, may be beyond the skills and resources of a small to medium business. Agreements might involve complex terms and conditions and involve substantial risks due to uncertainties about transfer agreement costs and longer term implications. Independent intermediaries can play a valuable role in assisting a business in dealing with a research organisation, from navigating their way through the multiplicity of administrative units to understanding the basic legal and contractual rules of the game.

(iv) **Translation gaps**—Knowledge and technologies, particularly when created by research organisations, are rarely in a form or format that can be immediately adopted and applied in a business/commercial situation. To ensure that knowledge generated through research can be brought into practice it may be necessary for significant investments to be made in *translation*—to put information and knowledge in a form and format that practitioners can receive, adopt and apply. Translation also addresses problems often referred to as ‘absorptive capacity’ and focuses attention on the provider rather than the receiver of knowledge<sup>1</sup>.

(v) **Gaps in university technology transfer capability**—the capacities and capabilities in research organisation technology transfer offices and research offices to support knowledge and technology transfer is uneven. Many have taken steps to increase their capabilities in knowledge transfer, particularly in the light of commitments to third mission, industry outreach and community engagement. Unfortunately, knowledge is rarely in a form that specifically addresses a business need. Internally and externally appointed intermediaries can play an important role in working with these research organisations to encourage, and recommend for funding, projects that will identify knowledge that meets a business and commercial need.

(vi) **Researcher orientation in government funded industry-academic collaborations**—the Australian Government funds a number of programs aimed at the transfer of technology and knowledge transfer from research organisations to business. These programs tend to be researcher initiated with a strong focus on research outputs and competitive assessment strongly weighted towards academic criteria. Many Australian Cooperative Research Centres are engaging ‘knowledge brokers’ to translate knowledge into forms and formats that can be adopted and applied by end users (Howard and Howard 2006)

### 3.2 Leadership

Studies indicate that leadership provides the cornerstone for collaboration in *regional innovation systems*. Case material also points to the importance of leadership in developing effective relationships and interactions between sectors. Significantly, that leadership quite often comes from the higher education and research sector rather than from government or business. Local Government can also perform an important facilitation role at a regional level.

Leadership needs to come from lead businesses—businesses that have found success in a region and whose continuing sustainability and viability relies on lifting the performance of all businesses in the region. It also needs to come from higher education institutions in building human capital and local talent pools through research, teaching and professional development programs, and taking initiatives in cooperative and collaborative ventures with the business community and government.

Universities with significant property assets are becoming major players in regional development initiatives involving investments in collaborative research, teaching and community facilities. In Australia this role is taking on a new momentum with funding flowing from the Commonwealth Government’s economic stimulus package in response to the Global Financial Crisis. The Government has accelerated the flow of grants from its \$9 billion Higher Education Investment Fund for major university infrastructure projects that are seen to be ‘shovel ready’.

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<sup>1</sup> USA research shows that only seven per cent of technologies licensed to business were ready for practical or commercial use and that licensed-in technologies have a high failure rate (Thursby and Thursby 2003). In Australia, organisations such as the Australian Mineral Industries Research Association (AMIRA), AMRAD (in the biotechnology sector), MinFab (ICT sector) and QMI Solutions (manufacturing sector) sit at the interface between technology development and product development. These entities have been established to test and develop technologies in business and commercial situations and parallel in some way the industry supported Research and Development Organisations that operate in the UK and formed the subject matter of recent work on intermediaries in the UK (Howells 2006).

Nonetheless, leadership in knowledge based regional development contexts rarely comes from government, or from industry bodies telling government what it should be doing. Leadership comes from people with a vision and a commitment to the future and a willingness to become involved in guiding the development process. In Australia State and regional (local) governments *assist* universities 'leverage' Commonwealth Government funding for initiatives such as cooperative research centres, major research infrastructure facilities, and other funding programs. They rarely take the lead in the process<sup>2</sup>.

### 3.3 Partnership

In well performing regional innovation systems, interactions are guided by an overall purpose (economic and other outcomes), generally well supported processes and protocols for interaction, and commitment by people, including the informal relationships that are built around pre-existing personal relationships, common understandings and partnership.

Effective partnerships arise from a longer term commitment built around the development of 'social' and 'relational' capital at the *executive* level in each sector: each must genuinely understand how the other works and the nature of the institutional drivers. It is possible to point to some collaborative successes in research, education, professional development (training) and extension (outreach), without this level of commitment, but overall achievement is patchy. It is not possible to point to a formula for success outside the social and relational dimensions.

Universities, businesses and government enter into numerous memoranda of understanding (MOUs) setting out intentions to work together. Many MOUs reflect an intention to share resources and provide mutual access to capabilities. For example, a University may enter into an arrangement with a private consulting firm to deliver professional courses and programs that might be accredited in award courses, or with a business to provide access to research facilities. The vehicle of the MOU avoids the need to take equity positions through non-controlling interests and avoid the inherent risks associated with such arrangements. A MOU, rather than a contract, provides a basis for building a relationship over time and working towards a stronger trust based relationship.

Universities also enter into MOUs with governments. A MOU between the Government of the Australian Capital Territory and the University of Canberra has recently been negotiated with the objectives to:

- More effectively meet the human capital requirements of industry, government and the non-government sector in the ACT and the region;
- Provide research based support and expert analysis for public policy development, implementation and review;
- Establish partnerships in research and work-integrated or industry based learning;
- Address specific professional skills demands in the Canberra labour market including provision of professional development for ACT Public Service employees;
- Develop structures and processes that facilitate shared communication of strategic priorities, infrastructure, staff and other resources to maximise the ACT's ability to leverage Australian Government funding and promote efficiency;
- Address educational under-achievement related to socio-economic disadvantage; and
- Promote the economic development of Canberra.

The MOU is seen as a first step in a longer term journey to create value for both Government and the University through collaboration, whilst at the same time retaining commitment to core mission and purposes. The University took the lead in negotiating the MOU, following a detailed study of the ACT and Region Innovation System (Howard 2007b). The MOU has already delivered outcomes in the areas of customised post-graduate teaching, research, consultancy and the interchange of staff.

## 4 Engagement management: from transactions to partnerships

A greater challenge is to work towards an understanding within business that Universities are not like supermarkets where 'knowledge products' can be simply purchased in an exchange transaction. In

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<sup>2</sup> A major exception is the City of Melbourne, which has supported the formation of the Melbourne Vice Chancellor's forum. The City seeks to position Melbourne as Australia's 'Knowledge Capital'.

general terms, business people do not know much about universities or how to work with them— notwithstanding that many business people are university graduates. Similarly, in universities, faculty deans and research directors need to understand that business is not simply a source of research and other funding—few deans and research directors have had business experience, particularly in a line management or operational role.

The task of University engagement management therefore is to not only open up conversations with business; it is effectively *an intermediary role* between the research, professional development and extension capabilities within a University and the strategic and innovation management roles and responsibilities within a business or non government organisation (NGO). Arguably, this role is performed more effectively within university management structures than by independent third parties or agents. Recent experiments in Australia using third party intermediaries have not always lived up to expectations (Howard 2007c).

These factors point to a requirement within universities to build capacity to create longer term trust-based relationships between university staff and senior managers in business and government. Such an approach cannot be mandated by structures: it requires agility, flexibility and acceptance of some uncertainty in relation to outcomes. This is the cornerstone of effective engagement management. Universities have been using a variety of engagement instruments, including adjunct appointment policies, to build business and government relationships. Senior university staff also participate actively in business forums and regional development councils.

Effective engagement is much less about structures, and more about people actually wanting to ensure that relationships are developed, managed and sustained. But in a tight economic climate, this activity has to be funded, and value has to be seen to be created and delivered for all parties. Government 'seed' funding can be important in this respect, but it is not the role of government to dictate terms of engagement through program funding frameworks, guidelines and conditions. Government needs to act as a partner—not just as a resource provider (although the resources are nice to have)<sup>3</sup>.

## 5 Conclusions and next steps

Economists and policy makers have recognised that knowledge and technology is important to economic development and growth. Unfortunately, economic models tend to see knowledge as a commodity—something that is produced (in a 'knowledge factory'), and bought and sold in a market.

The Triple Helix framework points to the cooperative, collaborative and mutually reinforcing nature of academic, business and government roles. Neither party, acting alone or taking initiatives, can drive the innovation process. In this framework innovation intermediaries assist in moving interactions from a market and organisational basis to a relationship basis. In this framework government is not only a resource provider but also a major user of knowledge in providing the evidence base for public policy decisions and program delivery arrangements.

The challenge, and the opportunity, for innovation is for government, universities, and business, to enter into longer term partnership arrangements where the focus is not so much on immediate transactional value, but on longer term value in the co-production of knowledge through collaboration where each party wants to understand each other's institutional setting, the differing motivations and behaviours of people, the way in which ideas are developed, and the pathways to innovation through investigation, experimentation, and presentation of evidence.

Moreover, in the context of the Global Financial Crisis, universities have been able to perform as significant partners in the delivery of major infrastructure projects that generate regional employment and stimulate economic growth.

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<sup>3</sup> In Australia State Governments generally provide less in the way of funding than they take in the form of payroll and other taxes and charges. Universities tend to be net *contributors* to State/Territory Government revenues.

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