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Risk and Trust in Cross-Sector R&D Projects

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ABSTRACT

The Cooperative Research Centres are hybrid organizations at the leading edge of change in Australia’s research culture and are key elements in the new knowledge infrastructure contributing to technological innovation. The paper presents findings from a qualitative study of CRC managers’ perceptions and management of downside risk in commercially-focused R&D projects. CRC managers deal with both performance risks (arising from uncertainties about achieving goals) and relational risks (arising from collaborative relationships). They do so through formalisation, the selection of people with desirable characteristics, and the building of relationships. Underlying these risk mitigation strategies is the formation of trust (a willingness to rely on a partner in whom one has confidence), and this occurs at both interorganizational and project levels.

Keywords: technological innovation, R&D, risk, trust.

INTRODUCTION

It is now widely recognised that, contrary to the classic linear model of innovation (e.g. Bush 1945), technological innovation most often results from linkages and interactions among a number of organizations. This phenomenon has recently been encapsulated in Chesbrough’s notion of ‘open innovation’ (Chesbrough 2003), i.e. in the so-called ‘knowledge economy’, wherein knowledge is widely distributed, firms need to rely more on external knowledge for innovation and can no longer solely rely on more closed internal R&D and innovation processes. Within this emergent context, and contributing to it, there have also been major changes in university-government-industry inter-relationships (Etzkowitz and Leydesdorff 1997), driven by both public policy and industry strategy. According to the ‘Triple Helix’ framework, these inter-relationships are now characterised by three features (Etzkowitz and Klofsten 2005): (a) a more prominent role for universities in innovation, (b) increasing cross-sector collaboration in R&D, and (c) a tendency for each sector to take on the role of the others with, for example, ‘entrepreneurial universities’ taking some of the roles that industry and government have traditionally played within national innovation systems (Etzkowitz, Webster, Gebhardt & Terra 2000). As part of the ‘new knowledge infrastructure’ (Etzkowitz and Leydesdorff 2000), various ‘hybrid organizations’ have been created at the interface of the public and private sectors to pursue or facilitate R&D, as exemplified in Australia by the Cooperative Research Centre (CRC) Program. This Program was established by the Australian Government in 1990 specifically to encourage cooperation amongst researchers, mainly located in universities and public sector research.
agencies, and research users mainly located in the private sector. It was hoped that this would strengthen the links between research and its practical application, thereby fostering technological innovation in the Australian economy.

While the benefits of this type of cross-sector collaboration have often been emphasized, the resulting ventures are often notoriously difficult to manage, not least because they bring together organizations with quite different cultures, interests, objectives, modes of operation, capabilities, timeframes, and commitments. But, despite a burgeoning literature which provides advice on how such cross-sector research collaborations can be made more effective (e.g. Geisler 1995; Cyert and Goodman 1997; Santoro and Chakrabarti 1999; Santoro and Betts 2002; Starbuck 2001; Barnes, Pashby & Gibbons 2002, 2006), there remains a dearth of empirical studies on the nature of the cooperative interactions and processes involved (Mora-Valentin, Montoro-Sanchez & Guerras-Martin 2004; Thune 2007). Furthermore, although the CRC Program has been formally evaluated twice since it was established, there have been relatively few studies of the operation and management of the CRCs as hybrid organizations at the leading edge of change in Australia’s research culture (Turpin 1997; Garrett-Jones, Turpin, Burns & Diment 2005). In this paper we seek to address this knowledge gap in what has become an increasingly important area for universities, industry and, more generally, the economy in Australia. We do so by reporting selected findings from a broader study of the CRCs as a medium for facilitating cross-sector R&D collaboration, and hence technological innovation, in Australia. In the study reported here we investigated the management of risk in commercially-focused CRC projects (i.e. those established with the intention of producing some return on the investment through, for example, new materials, products, technologies, and production processes, in contrast to those projects which are more concerned with producing ‘public good’ knowledge). These projects are central to the achievement of the program’s economic benefits and they are often seen as particularly risky for the partners in that, while much is at stake (e.g. in terms of investment, reputation, and financial returns), there is considerable uncertainty about the achievement of ‘successful’, mutually-beneficial and profitable outcomes.
We develop the paper, which is focused more on interpreting empirical data than on elucidating a theoretical framework, in the following way. We first provide an overview of the qualitative research methods used and then, drawing on the findings, we expand on the nature of risk and its management in the study’s context. We conclude with a discussion of trust, an emergent construct in the analysis of our data, and its role in mitigating perceptions of risk among CRC participants.

RESEARCH METHODS

Our overall aim in this part of the study was to gain an understanding of how CRC managers perceived and dealt with risk (which we defined as ‘downside risk’, the possibility that actions pursued within a collaborative partnership can go wrong, or not according to plan, resulting in some cost or other adverse consequence to one or more of the partners) in commercially-focused projects. We were interested in management perceptions of risk and how these informed management decision-making and action. As this was an exploratory study, we used a qualitative research approach and collected data through in-depth semi-structured interviews. Our sample comprised 10 CRC managers (i.e. at board and senior management levels) in four CRCs from the two main sectors of the program that had a strong commercialisation focus (i.e. Manufacturing Technology, and Medical Science and Technology). Interviewees were selected on the basis of their extensive knowledge and experience of the CRC Program. Interviews followed a schedule of six open-ended questions derived from our research objectives (e.g. 'In your view, what are the risks facing the CRC? We are interested here in sources of risk both for the CRC itself and for its R&D projects'). The interviews ran for 45 – 90 minutes and were tape recorded. The recordings were transcribed and the resulting interview transcripts were subject to qualitative content analysis following the approach described by Flick (1988: 192 – 196).

RISKS IN CROSS-SECTOR R&D COLLABORATIONS

Our qualitative study focused on the risks faced by partners in the CRC Program, wherein risk can be transferred from one sector to another. Thus, to enter into a collaboration exposes organizations to particular risks, and this has long been recognized in the interorganizational collaboration literature.
(e.g. Powell 1990; Ring and Van de Ven 1992; Nooteboom, Berger & Noorderhaven 1997; Das and Teng 1999, 2001; Nooteboom 1999; Genefke 2001). Prior to the study we had formulated a typology of risks in this form of interorganizational collaboration (Couchman and Fulop 2002a, 2002b) and we used this framework to help make sense of the data. We firstly distinguished between risks that arise from the collaborative venture itself and those that arise from the relationship between the collaborating organizations. The former, which are a particular problem for collaborations involving difficult or novel ventures such as R&D projects (Ring and Van de Ven 1989), arise from uncertainties about the venture being able to achieve its goals despite the best efforts of the partners. Such uncertainties arise either from the environment (e.g. government policy changes, fluctuations within national and global economies, changes in markets, structural changes in relevant industries, etc.) or from the venture itself (i.e. arising from its goals, organization, management and resources), and which do not result from any opportunistic intentions of the parties or from external events. Das and Teng (1999) have referred to such risks as performance risks, and they note that they are shared by all of the partners. Relational risks, on the other hand, are unique to interorganizational collaboration and arise from the resource commitments made, and the relationships of dependence entered into, by collaborating organizations. A major problem here is the possibility of opportunism (de Laat 1997), i.e. one or more of the partners, in pursuing their own self-interest, may act to the detriment of the other partners. Opportunistic risks include the possibility of (a) one partner exploiting the other partners to its own advantage, e.g. by breaking confidentiality agreements, misappropriating proprietary knowledge, appropriating all or a disproportionate share of benefits, etc., or (b) a partner not fully committing to the venture, e.g. by not providing agreed resources, harbouring hidden agendas, and delivering unsatisfactory products or services.

Our qualitative research revealed a heightened awareness of risks among CRC managers. Performance risks (e.g. required knowledge may not result from the research undertaken, critical competencies may not be accessible by project teams, interorganizational communication and management processes may be inadequate, critical human and technical resources may not be available, and financial resources may be inadequate) were identified, and were generally the focus of
formal risk management and project review processes, but it was the relational risks that were seen to be of particular concern. Given the space constraints of a conference paper, we illustrate this with three examples. The first arises from power imbalances which can lead to disadvantages and costs to certain of the partners or to the CRC itself:

*CRCs are held over a barrel by their industry partners to licence technology to them at discounted rates and with deals that do not benefit the research providers to the same extent as the industry partners. Industry partners always have the threat of withdrawal from the CRC as a bargaining tool that gives them the upper hand in commercial negotiations with the CEOs of CRCs. The need for industry money within a CRC is a stronger motivation than upsetting a research provider.*

The second is the risk of role subversion faced by public sector research organizations through their participation in these relationships (Nature 2001; Stephan 2001; Tijssen 2004; Fulop and Couchman 2006) and encompasses a loss of credibility as independent sources of authoritative knowledge with a potential for damage to their reputation, a dilution of their ‘public good’ knowledge creation and dissemination role, and an undermining of the trust dynamics that are central to the institutional framework of scientific research wherein there is an open sharing of knowledge within scientific communities. This latter problem was neatly encapsulated by an interviewee: ‘Researchers are under increasing pressures to ... publish [and] secure IP/commercialise. There is a risk that the second dictates the first and stifles scientific progress.’

Thirdly, the managers were aware and wary of opportunistic partners and the risks that they present to CRCs. One CEO, in discussing the problem of confidential knowledge spillovers, put the case as follows:

*I could not be the Director of a CRC that had [XYZ] as its core partner, I ethically, personally could not do that ... they’re certainly at this point under investigation by the FDA for misrepresentation of failure rates and problems of design of their technology. They basically infringed our patents, they’ve employed people who’ve stolen our intellectual property. I think they are one of the most unethical companies I’ve ever dealt with. They’ve made false claims on their website that affect patients’ choice of [therapeutic] device.*
MANAGING THE RISKS IN CROSS-SECTOR R&D COLLABORATIONS

We found that these risks are addressed within the CRCs in three main ways. Firstly, there is a strong emphasis on formalisation (which, following Vlaar, Van den Bosch & Volberda 2006: 1619, we define as ‘contracts, rules and procedures .... as well as processes of codification and enforcement’) in the establishment of a CRC and its ongoing management. The core partners enter into a contractual agreement with the Australian Government which clearly stipulates the roles, responsibilities and commitments of the organizations which constitute the CRC’s core collaborators. Formal structures are also provided for in the agreement, usually with a top-level Executive Board (consisting of senior representatives of the partner organizations) which has overall responsibility for the CRC’s direction, membership and policy. This top-level Board may be complemented with other formal management committees, such as Program and Project Review Committees, the actual structures adopted being contingent on the specific circumstances of the CRC. The day-to-day management of a CRC is usually overseen by a Chief Executive Officer (CEO) who has duties and responsibilities similar to those in the corporate sector. Reporting to the CEO is an hierarchy of managers with formally-prescribed roles, e.g. Business Manager, Research Program Manager, and Project Leaders. Formal procedures prescribe regular meetings of the Board, annual meetings of all CRC participants, and the establishment of projects. Projects are set up under a Project Agreement negotiated among a sub-set of the CRC partners, and this specifies the roles and tasks, responsibilities, resource and performance commitments, financial and in-kind contributions, as well as the rights with respect to any resulting intellectual property. Such agreements seek to provide a clear framework for managing the project, through agreed structures and procedures, in order to achieve the agreed goals or ‘deliverables’. Another notable feature of the CRC Program is the Government’s requirement for regular assessment and reporting, so all CRCs are constantly engaged in a process of evaluation against set performance criteria.

In a risky, ambiguous and uncertain setting, this formalisation attenuates relational and performance risks by helping the disparate participants ‘make sense’ of their involvement in a CRC (Weick 1995), i.e. helping them to achieve congruent understandings of what the CRC means both to them and to the-
other partners in the collaboration (as one of our interviewees put it: ‘attempting to understand each other’s agendas and points of view rather than juggling nine or ten’). This is extremely necessary in the context of cross-sector collaboration, given the divergent world views of public sector research agencies, universities and companies which can easily lead to different interpretations and understandings of the requirements and roles played by different participants within the CRC.

Another means by which the risks are addressed is through the selection and appointment of people with what are seen to be desirable characteristics to play key roles. Having the ‘right people’ is a recurrent theme among CRC managers (as one of them put it: ‘having the right people and the right processes in place, and having people who are willing to do a lot of work for the centre’), and refers to all levels in the CRC. At the top this starts with the board, where it is generally seen to be important that the chairperson is independent, experienced in running a board and able to resolve any problems among the board members, and is able to develop a good working relationship with the CEO. Board members represent their organizations in the collaboration, and an important requirement for ‘the right people on the board’ is that they are able to consider the interests of the CRC (not just those of their organization) and so be supportive of its initiatives and activities. CEOs are pivotal managers, according to our interviewees, and they play a crucial role in developing a vision and cohesive identity for the CRC, in ensuring that the CRC performs as required by all of its stakeholders, and that the needs of the collaborating partners are met. The experiences of our interviewees had convinced them that the board chair and CEO were decisive in ensuring the success of a CRC (and if they acted inappropriately could be primarily responsible for a CRC’s demise). The value of effective project leaders was also recognised by the CRC managers: good project leaders not only manage their project teams by ensuring the performance of tasks as required, on schedule and within budget, they also manage upwards to champion the project, represent it to the management hierarchy as well as other stakeholders (e.g. to the industry partners), and they maintain a regime of regular reporting on project progress. As for the researchers, the desirable features are seen to be technical capability, commitment, reliability, trustworthiness, and an ability to work productively within the operating parameters of the commercially-focused CRC. One of our interviewees summarised the attributes of these researchers in
terms of 'you know they are going to deliver'. With such people on the board, in management and conducting the project work, relational and performance risks are much less likely to be a problem according to our interviewees.

Thirdly, CRC managers spend much of their time building relationships in an attempt to pre-empt these risks ("The art of risk management, and exactly what you're doing [as a CRC manager], is managing the relationship"), both within the organization and especially with the industry partners. One Program Manager in a very successful and long-lived CRC observed that:

> We find that [industry collaboration] really is very, very tough, or can be very tough, and you certainly need a close personal relationship with whoever it is that's the champion or the Director on the industry side and the person [who is] their counterpart [on the CRC side]. See you have to build [collaboration] at all levels. You have to have senior management having a good relationship with the project teams.

This perspective was supported by the chairman of a CRC Board:

> It's the sort of thing you can't drive from the supply side. It's got to be from the demand side. But that is built like everything else; it's built upon relationships, with personal relationships and good working relationships at all levels. You know, good working relationships with [the industry partner's] board and with [their] CEO.

From the CEO's perspective, building relationships with the CRC partners ('being good at partnering') is an activity that is focused on achieving partner commitment to the CRC, and this can be fostered by helping the partners to recognise the value of the collaboration, by ensuring that partners become involved in the CRC's research program ('making sure [they] feel part of the research'), and by being responsive to the partners' needs. As one CRC Program Manager put it:

> ... it's about being responsive, it's about delivering on time ... it's about helping solve their problems, not the ones you would like to solve. It's about communication, it's about all those things [which] make them feel that it's damn good working with you because things happen.

Open and frequent communication is central to this relationship-building, as emphasised by a number of the CRC managers, although it was seen to be difficult in a networked geographically-dispersed organization like many of the CRCs:
I think good communication is very difficult to attain. ... our members [are part] of a large joint venture, spread all around the country and we’re a network organization. What you need to make a network organization work is ... you’ve got to have the processes in place, you need a very good website first of all and you need a damn good full-time communication manager to [ensure that information is shared] ... everybody can see what’s going on and everybody can talk to one another ... So, although [you are part of a] network, you have a sense of being...

For our interviewed managers, communication was essential to achieving a sense of belonging and thus commitment to the organization ('make people feel that they belong to something that is worthwhile'), and a number of them worked hard to ensure that this happened within their CRCs through formal and informal processes.

Building sustainable relationships rests on the formation of trust ('You’ve worked together and you get to know people and you trust them'). Where that trust is formed, and is reinforced over repeated interactions (wherein reliability, trustworthiness and goodwill are demonstrated), then relational and performance risks cease to become a significant concern for CRC managers. So, after pursuing our initial interest in risk, we came to trust. Formal mechanisms for dealing with risks – such as contracts, agreements, and reporting procedures – are not foolproof and neither can they cover all contingencies likely to arise in the uncertain context of cross-sector R&D. Trust dynamics can play a central role here, and are essential to the success of collaborations in which relational continuity is important (e.g. Powell 1990; Ring and Van de Ven 1992, 1994), especially for those which involve high levels of uncertainty about outcomes, as is the case with R&D projects (e.g. Ring and Van de Ven 1989; Häusler, Hohn & Lütz 1995). Further, the other two means of dealing with risk that we identified in our study, selecting the right people and building relationships, both involve trust.

**TRUST IN CROSS-SECTOR R&D COLLABORATIONS**

Trust is a belief or expectation held by individuals, or groups of individuals, about other individuals, groups or entities such as social institutions and organizations. This attitude involves a subjective assessment about whether to expose oneself to vulnerability in situations of risk or uncertainty (Luhmann 1988: 96). To trust is to accept vulnerability (i.e. the possibility that some harm to the trusting person could result), and is based on positive expectations about others (Mayer, Davis &
Schoorman 1995) where there is some uncertainty about the future behaviour of those in whom the trust is placed and on whom there is some degree of dependence (creating the risk that the trust is misplaced). This belief or expectation creates a behavioural disposition (e.g. 'a willingness to rely on a partner in whom one has confidence', Moorman, Zaltman & Deshpande 1992: 315) and leads to trusting behaviour (e.g. acts of entering into a business partnership, engaging in an economic transaction, etc.). Trust is built through repeated interactions (Zucker 1986; Gulati 1995; Kramer, Brewer & Hanna 1996), in which the trustor learns that the risk of trusting another is worth taking. It is also dynamic (Nooteboom and Six 2003), in that trust towards another may change over time due to changing circumstances or to experience.

In our study we learned that trust develops and is maintained within relationships at two inter-related levels: (a) inter-personal relationships among the members of a CRC project team, and (b) interorganizational relationships among the partners in a CRC and from whom project teams are drawn. For this type of collaboration, understanding the multiple levels of relationships is important (Zaheer, McEvily & Perrone 1998). The first level of relationships involves both researchers and industry personnel working together towards a common goal. Within the project teams, however, trust is developed not just among researchers within a disciplinary field, but also among researchers in different disciplinary fields (e.g. surface chemistry, polymer chemistry, and ophthalmology) and between researchers and industry-based team members; here trust may be problematic due to different norms, socialisation processes and sanction systems of the participants. However, within a project team, trust can be developed over repeated interactions where the participants come to learn that the others are reliable, trustworthy, open and fair in their dealings, and unlikely to take advantage of other team members for short term gain (Tapon and Thong 1999).

At the interorganizational relationship level, a set of firms and public sector organizations with an interest in an area of industrial applications (e.g. medicine, the manufacture of automobiles, the development of computer software, etc.) enter into a contractual agreement with each other and the Government to pursue mutually-agreed research and education programs. Interorganizational trust is the result of trust among decisive individuals at different levels across the organizations (e.g. higher
level managers in universities and firms), and these interpersonal trusting relationships may vary among the different organizations, with changes in personnel, and over time in response to changing situations. Trust between two organizations thus arises where there are ‘two sets of individuals each of which is trusting the organization of which the others are members’ (Blois 1999: 203). These are interorganizational relationships in which the individuals involved make judgements about other organizations and the individuals in them. But they do so at least partly as a function of their organizational roles (Ring and Van de Ven 1994: 95; Nooteboom 1999: 35), and this role-playing behaviour may influence their perceptions of others (Blois 1999: 210). Over time, and with repeated interactions between the organizations where positive outcomes result and there are no negative effects, the relationship can become habitualised and the trusting behaviour institutionalised (Nooteboom et al. 1997). Where this occurs, the trust relations have become ingrained in the routines and practices of the collaborative venture and the partners within it (Dodgson 1993), thereby transcending interpersonal relationships.

**CONCLUSIONS**

Trust among partners is an important element of the means through which CRC managers at different levels build relationships and address the risks (performance-related and relational) faced by organizations entering into this often ‘risky’ form of collaboration. Building sustainable and productive relationships in this context rests on the formation of trust among the participants. Where that trust is formed, and is reinforced over repeated transactions, then relational and performance risks cease to become a major concern for CRC managers. Trust reduces uncertainty among partners and the fear of opportunism, it enhances cooperative behaviour so contributing to higher partner satisfaction and partnership efficacy, it minimises the effort required for contract negotiation and monitoring, it encourages the sharing of proprietary information and new knowledge (critical for R&D partnerships), and through such mechanisms reduces transaction costs as well as the subjective risk of entering into a relationship.

Given the nature of the cross-sector R&D collaboration we studied, the relationships involved have to
be understood in terms of multiple levels and the interactions among them. Thus, the conditions under which trust can be formed and sustained can be theorised in terms of a multi-level process, comprising the engagement of organizations at one level and with a subordinate level at which trust is formed and maintained as project teams seek to develop effective working relationships and deliver on project objectives. At the organizational level, the partners commit to the relationship (as they become part of a CRC) and trust is important for the development of an effective collaboration among them because it reduces complexity and uncertainty about the relationship. The organizational level of risk containment and relationship building (e.g. the creation of formal systems and procedures, the selection of key CRC managers and board members, the contractual agreements entered into, etc.), with the resultant trust relations among the partner organizations, structures and shapes the formation of trust at the project level. Projects are task-focused and have a limited life, they involve a subset of the CRC partners, and they employ personnel who are only temporarily attached to the CRC. Here a capability for effective communication helps manage expectations and develop common understandings, reduces project risks and uncertainties, fosters commitment, contributes to the building of a collective identity, and helps develop trust (Couchman and Fulop, 2004). Also critical at this level is a capability for managing the ‘cultural gap’ between the sectors, through which it is ensured that the operational timeframes of project team members are aligned, both commercially-exploitable and published scholarly knowledge are produced, and the disparities in the organizational cultures are managed for mutual satisfaction (Couchman and Beckett, 2006).

Cross-sector R&D collaboration is an increasingly important area in most developed economies like Australia, with significant implications for the participants (notably for universities; Fulop and Couchman, 2006). But it is risky, and the means used by managers to deal with the risks involved are critical for the efficacy of the collaborative ventures. Our study has confirmed the importance of relationship building in addressing these risks and it highlights the importance of trust within and across the organizations engaged in this form of R&D (see also Leibeskind and Oliver 1998). We hope that other researchers will respond to this modest study to further develop our understanding of risk and trust, as well as their forms, determinants and consequences, in this important area.
REFERENCES


