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Engaging in Collaborative R&D: 
An International Case Study of Cross-Sector Collaboration

Paul K. Couchman  
School of Management and Marketing 
University of Wollongong 
Wollongong NSW 2522 
paulc@uow.edu.au

Liz Fulop  
Griffith Business School 
Griffith University Gold Coast Campus 
Southport QLD 9726 
l.fulop@griffith.edu.au

Abstract
This paper examines cross-sector engagement by drawing on a case study of a successful R&D project which involved an Australian Cooperative Research Centre (with CSIRO as a partner), and the eyecare products company Ciba Vision. This project resulted in the market launch of an extended wear contact lens, a breakthrough product. The engagement process moved through two phases. In an initiation phase, partner reputation and the potential for complementary resources were important in the partnering decision. In an engagement phase, the partners built a relationship and focused on the tasks to be completed. In doing so, they made a number of credible commitments to the venture (most notably to jointly assign project intellectual property between the public and private sector partners), developed a trusting relationship, adopted a disciplined and effective project management approach, learned the capability for cross-sector collaboration management, and put much effort into fostering communication to facilitate team building and the task focus. The management approach taken lead to a positive experience of the project among the partners, and this was positively associated with tangible project outcomes. Such collaborations may persist across projects, but in a disengagement phase negotiations on the conditions of exit may be required. It is concluded that to build a successful cross-sector collaboration requires interpersonal engagement within and across the organizations involved.

Keywords: R&D collaboration, engagement, risk, trust, credible commitments.

Introduction
Since the late-1990s, the incidence of interorganizational R&D collaboration has increased as companies have sought not only to gain access to new knowledge, technologies and markets, but also to share the benefits, costs and risks of innovation. Such collaborations take a number of forms, including strategic alliances, partnerships, joint ventures, consortia, and various types of networks. This phenomenon has included collaborations that cross public and private sectors to perform “commercially-risky” R&D projects. These cross-sector collaborations have developed under the impetus of government policies which seek to foster technology transfer between the public and private sectors, and fiscal pressures which impel public sector organizations to expand their revenue base through engagement with industry. While the benefits of this collaboration have been emphasised, the resulting ventures are often notoriously difficult to manage, not least because they
bring together participants with quite different interests, objectives, modes of operation, capabilities, timeframes, and commitments. This paper explores the dynamics of cross-sector collaborative engagement by drawing on a case study of a successful R&D project which involved Australian public sector organizations and a major multi-national pharmaceutical corporation. The case study was part of ongoing research on the management of risk in cross-sector R&D collaborations, specifically those conducted under the Australian Cooperative Research Centre (CRC) Program. Following the burgeoning interorganizational collaboration (IOC) literature (e.g. Ritter and Gemünden, 2003), we framed our research in terms of “collaboration” in the sense of organizations working together to achieve common goals (e.g. through the establishment of a joint venture or dedicated research unit). But we could have alternatively framed the research in terms of “engagement”, given that the latter term derives from the Old French *engagier* “to pledge” and so connotes the making of a binding commitment to a relationship by the organizations involved. Thus, to build an effective collaboration (i.e. one which delivers benefits to all parties and which avoids negative consequences for them) requires that organizational actors *engage* (e.g. by making commitments and building trust) with their counterparts in other organizations. But to so engage exposes an organization to risk, e.g. the possibility of one partner opportunistically exploiting the other partners, and this risk has to be managed as part of the cost of collaboration (Genefke, 2001).

**The “SEE3” Project**

Our case study (Couchman and Fulop, 2004a) investigated the establishment, development and outcomes from a collaborative R&D project jointly conducted by three organizations: the CRC for Eye Research and Technology (CRCERT), Australia’s major national public sector research agency (CSIRO), and Ciba Vision which is now a division of the Swiss-based multinational corporation Novartis AG (a company formed in 1996 from the merger of Ciba-Geigy and Sandoz). The project involved collaboration among scientists, engineers, clinicians and other product development specialists based in four different locations around the world (see figure 1). The collaborative project was formally initiated in 1993, and one of its major aims was to develop a commercially-viable contact lens which could be worn continuously for a period of up to one month. The project began in 1991 when the Director of the newly-established CRCERT approached Ciba Vision (CV) and offered a collaborative partnership in the development of what was then a new technology (i.e. of silicone-based hydrogels) for an extended wear contact lens. CV accepted the offer, and in January 1993 signed a contract with the CRC. Under this contract, CV agreed to initially provide 5 million Swiss francs of R&D funding over three years and this was to be matched by the CRC with equivalent resources (largely in-kind contributions of CRC partner research time). The “Sec3” Project was set up under the CRC’s Biomaterials Program, and different partners in the Centre were assigned responsibility for specific elements of the project’s work breakdown structure according to their areas of expertise; e.g. CSIRO was responsible for surface science work (to create special lens coatings to hold a tear film and resist fouling) and polymer synthesis, while the Cornea and Contact Lens Research Unit (CCLRU) managed clinical trials of the developed products. Parallel R&D and product development work was carried out within two units of CV, one in the USA and the other in Switzerland. The collaborative entity established for this project was a variant of the “integrated R&D network” identified by Gassmann and von Zedtwitz (1999) with its “geocentric organization, lead-country concept, partnership among all competency centres, and unrestricted flow of information”. In this form of international R&D organization, which in the case study involved both Australian public sector as well as company R&D units, complex coordination structures are required:

In particular, the role of the central R&D site changes from a control centre to an R&D unit with equal rights and duties. Flexible connections and relations between network partners enable better utilization of available competencies, contribute to the realization of specialization and scale effects, and reduce the risk of duplicate development. Multi-site projects pose an ideal forum for focusing goal and task-oriented resources, while their temporary character assures their flexibility. (Gassmann and von Zedtwitz, 1999, p. 244)
The project involved 70 scientists (around 100 people in total) working in teams at four sites. The key tasks of the project were: to develop a contact lens which could be worn continuously for up to 30 days, to manage the intellectual property created by the project, to test the effectiveness and safety of the new lens in clinical trials, to obtain regulatory approval for the final product, and to develop a commercially-viable manufacturing process. By 1997, the new lenses made from “an entirely new revolutionary material called lotrafilcon A” had been produced and successfully trialled in a six-month pilot study (patent applications for the new lenses had been filed in Germany, Switzerland and the USA in 1995). They were then subject to US Food and Drug Administration trials (conducted in 3 countries), and were subsequently approved for daily wear (FDA approval for extended wear usage was not granted until October 2001). In November 1998 test marketing of the new lens, branded “Focus Night and Day”, began in Mexico and at the same time CV publicly announced the breakthrough new material in a news release on 24 November 1998. Full launch of the product began in Spain in January 1999, with limited release in Australia and New Zealand in May of that year. This was a large and ambitious project, but one which all of the participants agreed was highly successful. It was clearly a high stakes project with a potentially high commercial pay-off: to be first-to-market in a growing and lucrative market for soft contact lenses (Croes, 2002).

**Case Study Analysis**

Analysing this case study from the perspective of interorganizational engagement, we conceive of the engagement process in terms of three main phases: (a) an “initiation phase” in which suitable partners are sought and assessed, (b) an “engagement phase” in which an effective collaboration is built and sustained, and (c) a “disengagement phase” in which the collaborators terminate their working relationship. We shall here mainly focus on the first two phases, and in doing so will deploy, and
illustrate the role of, key constructs which help account for the dynamics of engagement in the case study. The analysis is represented diagrammatically in figure 2.

The Initiation Phase: Reputation and Complementary Resources

Both parties were highly motivated to enter into a collaborative relationship. The industry partner sought access to relatively cheap scientific-technical knowledge and R&D competencies, complementing their own, in order to become first mover in a lucrative market. The CRC and its partners (most notably the CSIRO) sought to gain access to funding and to further enhance their reputation as leading edge technology-focused researchers. But why did the partners select each other? The initiation of an interorganizational engagement begins when one or more organizational actors identifies an opportunity and this acts as a triggering entity (Browning et al., 1995; Corey, 1997; Doz et al., 2000). In the case study, an opportunity was identified by the CRC Director and was taken to a major multinational company to seek a collaborative venture (Brook, 1999). The head of CV’s R&D and Marketing at the time was in the process of reorganising the company’s research programme with a view to obtaining more focus. He thought that the Director’s proposal “was a great idea”, so proceeded to include the SEE3 project in the company’s research programme and subsequently:

He came down with his lawyers, and our Director and our lawyers sat [with them] at the table for 3 or 4 days and out came the contract. (CRC team leader)

Figure 2: Case Study Analysis

This process of partner selection cannot simply be understood in terms of an interpersonal interaction, a meeting of like minds, although personal contacts are important as a CRC interviewee indicated with
respect to the origins of the project: “Brien and Adrian had a conversation, [they] obviously struck it off and it just happened. It all works for us, that personal contact. If you can find somebody in a company that believes in what you are trying to sell them and believes in you, it [works] a lot better than just knocking on a door and saying ‘here we are’”. Rather, firm behaviour is “embedded” (Granovetter, 1985; Gulati, 1998). The actions of organizations are embedded in social networks of relationships, with many linkages among a wide range of other organizations, personnel, professional and industry associations, government agencies, etc., and this embeddedness influences the actions taken. The Director, the CRC, its partners and the company were part of overlapping social networks (e.g. in the professional fields of ophthalmology and optometry) so there was a degree of mutual awareness, although they had not worked together before (previous experience of working together has often been identified as an important factor in determining whether partners will collaborate again; e.g. Gulati, 1995a; Barnes et al., 2002; Daellenbach and Davenport, 2004). The company approached had specific and desirable attributes for the Director. CV was established in 1980, as a spin-off from the parent company’s (then Ciba-Geigy) US Pharmaceutical Division, when it entered the soft contact lens market. CV was the 27th entrant in the world contact lens market, and by the early 21st century had become the world’s second largest contact lens company. CV’s rise to industry prominence has been the result of extensive product innovation (e.g. over the period 1981 to 1994 it introduced seven breakthrough contact lenses and lens care products). It has also expanded through strategic acquisition, e.g. in 2000 it acquired the US contact lens manufacturer Wesley Jessen (an important player in the US industry) to become the second largest company in the industry worldwide. It has also publicised itself as a company which “achieves innovation through partnerships”.

For the CRC Director the company was a source of the considerable resources required for product development and testing (critical for regulatory approval) as well as for international marketing. The company was aware of the CCLRU (a prominent player in the ophthalmologic and optometry research fields) and had been recommended to CV’s executive as a group which had much to offer the company. This general awareness on its own was not sufficient however. Two other factors were decisive. The first was the Director’s reputation as a leading clinical researcher who had published a seminal study that established the level of oxygen permeability required of a contact lens to avoid oedema in overnight wear (Holden and Mertz, 1984). The reputation of partners has been widely invoked in the collaboration literature to explain the decision to enter into a relationship (e.g. de Laat, 1997a; Dollinger et al., 1997; Mora-Valentin et al., 2004). In a technical field such as that of the case study, reputation rests on prior achievements, professional experience and the research credentials of those in the potential partner organization. The scientific reputations of the Director and of key researchers associated with the CRC were central to the company’s decision, and the case study supports the assertion of Daellenbach and Davenport (2004, p. 196) that “during partner search, assessment of trustworthiness of new or unknown partners will be based on the known abilities of those partners”. The second factor important for the company’s decision to enter into a partnership with the CRC was that the centre offered a wide range of complementary R&D resources (e.g. scientific research in the areas of polymer synthesis and surface chemistry as well as the design and management of clinical trials) organised under one umbrella. These complementary resources created a situation of strategic interdependence (Gulati, 1995b) and this, combined with a partner that presented fewer risks and costs than another firm (e.g. because of its status and orientation, a public sector partner is less likely to act opportunistically), ensured the Director’s offer was too good to refuse.

The Engagement Phase: Credible Commitments, Trust and Communication

For a successful engagement to occur, all partners need to develop the view that the collaboration will deliver benefits that outweigh the costs and risks of collaborating. Successful engagement depends on the partners effectively building their relationship and focusing on the tasks to be completed. This leads to an “escalation of commitment and satisfaction: successful collaboration feeds on itself, its ability to meet the objectives of equity, efficiency, adaptability, and on its ability to maintain its legitimacy” (Doz et al., 2000, p. 242). In seeking to achieve this, the partners have to manage four...
main tensions that are specific to cross-sector collaborations (Couchman and Beckett, 2001): (a) differing timeframes – the short term business-focused deadlines of industry versus the longer term and less tangible deadlines of public sector agencies, (b) differences in knowledge sought – companies seek applied and commercially exploitable knowledge in contrast to scholarly knowledge, (c) a differing valuation of knowledge – knowledge as a commodity versus knowledge as a “public good”, and (d) disparate organizational cultures. Organizations vary in their ability to manage these tensions (e.g. due to differences in strategic orientation and previous experience with this type of collaboration), and we argue that the ability to effectively do so (as was evident among the case study participants) is associated with two main conditions for collaboration success.

We have previously argued (Couchman and Fulop, 2004b) that a cross-sector R&D collaboration which has both a strong relationship focus and a strong task focus is likely to be seen in more positive terms by the partners, and in turn the partners’ collaboration experience is positively associated with more tangible project outcomes (on the basis of a survey of n = 156 CRC project leaders, we now have empirical support for this assertion; e.g. there is a highly significant positive correlation between collaboration experience and the assessment a project was a success, p < 0.001 r = 0.637 ). The relationship focus can be conceived of in terms of relational trust, which is widely held to be a critical factor in the success of collaborative relationships (e.g. Nooteboom, 1999; Das and Teng, 2001; Woolthuis et al., 2005). Although the construct of trust has been defined in many ways, we follow Boersma et al. (2003) and Ryan et al. (2004) in drawing on Sako’s definition, which refers to an expectation that partners will behave in predictable and mutually acceptable ways (Sako, 1997). This offers a multi-dimensional view of trust with three main components: (a) contractual trust – the belief that partners will adhere to agreements and keep promises, (b) competence trust – the belief that partners will perform their roles competently, and (c) goodwill trust – the belief that partners will act fairly and honourably in their dealings, going beyond formal agreements to benefit the partnership. In the case study, all three forms of trust were developed among the partners during the project’s life: the various actors demonstrated that they would fulfil agreements and meet obligations, they mobilised the required knowledge and competences to deliver on project objectives, and they revealed a “respect for a partner’s abilities, commitment based on belief in mutual benefit, and open and honesty in objectives” (Dodgson, 1993, p. 92).

At the outset of the project no such trust was evident, for collaboration of this type and scale had not been previously undertaken by any of the partners. But, according to project participants, one of the main factors contributing to the project’s success (it was seen by the public sector partners as “a very strong collaboration”) was the initial commitments made by the partners to the project. These commitments included: the allocation of resources in accordance with the role and stake of each of the parties, the free sharing of project information with an explicit commitment to have no secrets or hidden agendas, a CRC undertaking to segregate and restrict the area of research collaboration to the single industry partner (thereby eliminating the risk to the firm of spillovers to other CRC industry partners), and the joint assignment of IP rights resulting from the project. This latter commitment was particularly notable for the agreement was that intellectual property would be shared 50/50 and the CRC would earn a 3% royalty regardless of who achieved the invention (the contact lens material actually resulted from research by one of CV’s R&D units rather than from the CSIRO research):

But really in the end, it didn’t matter which one succeeded because of the collaboration that we got and I think that is really what makes a huge difference. If we had only received a royalty or a share of the IP that we were actually hands-on inventing, then it would not have been the same. When this [project] was put together it was understood that there would be the mind melding and sharing of ideas that’s important for making these advances. The experience that one person has, [but which] may fail, is very crucial to the next person’s success, and that was appreciated too. So that is a very healthy and stimulating environment in which to work. (CRC project leader)

This commitment ensured that, for the public sector partners, there would be a flow of royalties if the project was successful, thus providing a material return for their participation.
Following de Laat (1997b), we argue that these “credible commitments” (see also Williamson, 1983; Gulati et al., 1994; Holm et al., 1999) are an important pre-requisite for developing relational trust in a situation where the partners had not worked together before and there was a high level of risk to the partners, especially given the possibility of partner opportunism and the uncertainty of R&D outcomes. The fear of opportunistic behaviour (e.g. where partners appropriate proprietary knowledge, out-learn other partners or leak information to competitors) creates “boomerang hazards” in many R&D collaborations (de Laat, 1995). We have observed that credible commitments can be used either on their own or in conjunction with contracts to facilitate the sharing of commercially- valuable information and the development of norms of reciprocity that help overcome relational risks and build relational trust. As a form of pledging, such commitments are more than merely symbolic declarations, for they entail actions that bind a partner to a relationship by “tying their hands” (Anderson and Weitz, 1992). They are often “idiosyncratic commitments” in that they cannot easily be deployed to other relationships and so represent sunken costs.

Another of the main factors contributing to the project’s success, and supporting our argument above, was the project management approach taken. Collaborative ventures are established to achieve particular goals (most often within a given budget and time schedule) and for this a task focus, with the necessary project management capabilities, is essential (see also Barnes et al., 2002). There were three key features of the “disciplined” project management approach taken in the case study. The first was the project management structures that were put in place. At the top level was a steering committee (“we need a group that is going to chart direction”), with equal numbers of representatives from the company and the CRC. This met formally every six months (although there were many informal interactions in between these meetings) to review progress and set project milestones. The project schedule was documented in a “contract book” and a “master plan”, and commitment to the goals specified therein was sought at an early stage from all participants. A second feature was that it was recognised that the selection of project team leaders was crucial to the project’s success, and so an effort was made to select leaders that were skilled as “integrators” (i.e. able to integrate findings across disciplines). A third feature was the project’s task organization. “Critical tasks” (such as polymer synthesis, surface chemistry and clinical assessment) were placed on “parallel tracks”, i.e. were conducted at several sites simultaneously. This was important in terms of balancing the power relationships in the project by not allowing any one group to become too central to the process. Phased commitments ensured that knowledge was shared as the project unfolded. It also created healthy rivalry. For example, the polymer synthesis laboratory work was carried out concurrently at CSIRO, CV USA and CV Switzerland; the three teams had the same goals, but used differing and complementary approaches. This lead to “friendly competition”, with the teams benchmarking each other, and ensured that the project was rarely brought to a halt because of technical problems at one site. Also, with different teams working in parallel on the same problem, more options could be explored and tested in the time available. This project management approach ensured that the project met its objectives and that it was experienced as “an exciting project, with high levels of satisfaction ... [and] very motivating”.

There was considerable emphasis placed on fostering communication among the participants (“a philosophy of information over-dissemination was adopted for the project”), in order to achieve team-building (a relationship focus) and effective project management (a task focus). Effective and intensive communication was seen as crucial, given the different communication styles of the collaborators (e.g. polymer chemists and clinical ophthalmologists) and the differences in their work environments (most notably between the laboratory-based work of the scientists and the more structured activities of other specialists such as product development engineers). Three media were provided to facilitate high levels of communication and support collaboration among all participants. The most critical of these was the provision of a secure computer network linking all members of the project teams and the relevant organizational managers. Access to project information was via a groupware workspace through which participants could: email each other, communicate in a synchronous “chat” mode, gain access to project databases and documentation, contribute to “bulletin board” discussion groups, securely transfer files, and obtain regular project updates. The philosophy...
behind this “groupware-based” network was that all participants, across both disciplines and organizations, could access virtually all project information to support team integration and contribute to “project energy”. Project information could be accessed and communication carried out (either synchronously or asynchronously) at any time through this network, and this feature was considered to be more consonant with the working style of laboratory scientists. This mode of communication was augmented with regular teleconferences among the different teams, held every 1 – 2 weeks. A third medium, based on an explicit recognition of the limitations of electronically-mediated communication, was a series of 6-monthly face-to-face project review meetings, held over a 3 – 4 day period at what were seen by the public sector researchers as “prestige locations”. These were held at the same time as the Steering Committee meetings and articulated with them (“Two days [are devoted to] reviewing the science and the research that we are doing, and then there is a one-day steering committee meeting”), which lead to a strong focus among the various R&D teams on delivering the planned project outputs:

In the early days of the See3 project .... and it still is the case, the amount of work we do before we go to one of the six-monthly meetings [is extensive]. There is always a push to do the right thing because you want to present [what you have achieved]. Because ... you have done the work, you [make] the most of that, so it certainly helps with the outputs (CRC Project Leader)

So, the case study is consonant with our theoretical model of the engagement phase, as shown in figure 1. That is, in setting up and managing the project the partners did take both a relationship focus (as indicated by the trust developed) and a task focus (evidenced by the effective project management approach), and this contributed to the positive perception of the project among the partners as well as the successful project outcomes (i.e. the lenses were developed, tested, received regulatory approval, and were marketed internationally earning the company a stream of revenue; the public sector researchers were joint assignees for the new product’s patents, and have since received a stream of royalties from these). The partners developed a capability for managing cross-sector collaborations (e.g. the timeframes of the public and private sector partners were synchronised, and both academic papers and intellectual property were produced), and this contributed to the building of the relationship and the project management approach. The emphasis on intensive communication and open information sharing among all project participants also contributed to this joint relationship and task focus. Finally, the credible commitments made by the partners at the project’s outset contributed to the building of trust among the partners. In the next stage of our research, we will empirically test this model (using the data from the survey of CRC project leaders) to see if it provides a valid account and is generalisable to other CRC projects.

The Disengagement Phase

Disengagement occurs when one or more of the partners terminate their involvement in a collaboration, which may require some negotiation on the details of exit (e.g. on the disposition of sunken investments and common intellectual property). This may occur prematurely, before a venture has achieved its objectives (e.g. in our survey of CRC project leaders, we found that one or more of the original partners had pulled out of a project before it was completed in 16% of the cases), an indication that an organization had failed to achieve engagement with the venture (e.g. due to a change in strategy, financial pressures, changes in key personnel, a failure to be convinced about the venture’s benefits and risks, etc.). Under the CRC Program, collaborations among the partners in a CRC may persist for the life of the CRC or even longer, but the R&D conducted is most often project-based and as such the projects have a finite life. The CRC partner collaborations will thus involve a series of projects, each may have a different configuration of partners and each of the project agreements will specify what happens to assets (such as intellectual property and physical research resources) after a project is completed. Where a project collaboration is seen as successful by the partners, then it is likely this will lead to further collaboration as happened with our case study. The CRCERT has continued its collaboration with CV after the “See3” project, as a CRC interviewee noted “.... we are
continuing to talk with them about the next projects we are going to work on with them ... right now for the CRC, Ciba Vision is our main industry collaborator, and that is where the majority of the [research] work is happening ...”. However, there is no guarantee that an industry partner will stay engaged with a venture. Another project on which the CRC began a collaboration with CV was the development of a synthetic implantable cornea. But before the project was completed, the company pulled out leaving the CRC without an industry partner for it:

... [CV] were also sponsors for the implantable contact lens based on their Surgical Division. [But] their surgical CEO jumped ship and they terminated the agreement with us. So there is a risk, you are only as good as you are. Our success with the See3 project was not enough to keep the other going when they lost their CEO. They just could not put much money into the R&D. (CRC project leader)

This is a particular risk that public sector research agencies face in their collaborations with private sector partners, and can prove both disruptive and costly.

Conclusions

Interorganizational engagement, in the form of collaborative ventures to pursue R&D and technology development, entails that organizations make binding commitments to the venture and to the other organizations in it. To successfully complete the collaborative venture requires that the partners both build their relationship and focus on the tasks to be achieved. This process of engagement can be difficult, especially in cross-sector collaborations where the partners have markedly different cultures, orientations and modus operandi, and can expose the organizations to various risks (in organizational studies and economics, the risks most widely addressed have been those of partner opportunism). Such risks can be particularly problematic for public sector organizations, as we have argued elsewhere (Fulop and Couchman, 2006). Above all, building a successful cross-sector collaboration requires vertical and horizontal engagement within and across the collaborating organizations; as one CRC project leader put it:

We find that [industry collaboration] really is very, very tough, or can be very tough, and you certainly need a close interpersonal 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.

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