

**Credible Commitments in R&D Collaborations:
A Testing Exercise with a Troublesome Construct**

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ABSTRACT

The findings reported here are part of a larger study on cross-sector R&D collaborations in the Australian Cooperative Research Centre (CRC) Programme. The study has sought to explain project partners' collaboration experience using a theoretical model which was empirically tested with a survey of CRC project leaders. A key hypothesis was that the higher the level of relational trust amongst the partners in a collaborative project, the more positive would be the partners' experience of the project. The construct of "credible commitments", which is widely used in the inter-organisational literature, was posed in the model as an antecedent of relational trust and positively related to it. No support was found for the hypothesis. The findings are discussed and future areas of research.

Keywords: credible commitments, trust, R&D projects, inter-organisational collaboration

INTRODUCTION

In this paper we discuss the background to, and an attempt to measure, a particular theoretical construct that has been widely applied in a number of disciplinary domains of relevance to management and organisational studies: "credible commitments". By so doing we seek to contribute to the burgeoning literature on inter-organisational collaboration (IOC), i.e. voluntary cooperative relationships between two or more organisations which involve reciprocal, preferential and mutually-supportive actions. Our focus is on cross-sector collaborations in IOC and to a growing area of R&D activity. It is now widely recognised that the incidence of IOC (in the form of strategic alliances, joint ventures, partnerships, supply chain relationships, and networks) has been increasing since the late-20th century and, reflecting this trend, there has been a concomitant growth in academic interest (e.g. Gray, 1999; Powell, 1990; Gulati, 1998; Ritter and Gemünden, 2003). Despite this interest, and the growing body of literature that this has generated, our theorising on the nature and development of IOC remains not only poorly developed, but is also fragmented within and across disciplines.

We have been studying a particular form of IOC that involves organisations from both public and private sectors working together in consortia to perform R&D, and we have investigated the Australian Cooperative Research Centre (CRC) Programme as an example of this type of cross-sector collaboration. Our focus in this study has been on the management of risks by the partners in

commercially-focused projects conducted under the CRC Programme. While it is well-documented that such projects are considered to be “risky business” (e.g. due to the uncertainties of R&D, the difficulties arising from disparate partners learning to work together, and to the vagaries of commercialisation processes), there has been little research to date on the risk management practices of those engaged in such endeavours (Couchman and Fulop, 2002).

In the remainder of this paper we provide a background to an empirical study we have undertaken involving a sample survey of CRC project leaders, in which we sought to test a theoretical model to explain partner experiences in CRCs. We started our study of cross-sector collaborations by investigating “downside risks” (i.e. the possibility of some adverse consequence to a participant resulting from their involvement in a CRC project), but soon came to recognise the importance of trust in the building of effective collaborations. In attempting to identify the antecedents of trust, we drew on the literature on credible commitments and the management of opportunism and risk in R&D collaborations to hypothesise a positive relationship between credible commitments and trust. While trust in partnerships has been widely studied, the relationship between credible commitments and trust has not, though it has been theoretically argued to be a critical relationship in R&D collaborations (de Laat, 1997a). We are the first researchers in the field of study to formally pose a testable hypothesis on this relationship. Furthermore, this was the first time that the construct had been applied to cross-sector multi-lateral collaborations, and when we empirically tested our model, it was also the first time that the construct had been measured in a quantitative study. We failed to find a positive relationship between trust and credible commitments. This unexpected result poses some important questions about the nature of cross-sector R&D collaboration in the context of consortia such as CRCs. We discuss our findings and their implications for understanding the role of credible commitments in the formation of inter-organisational collaborations and suggest areas for further research.

BACKGROUND TO THE STUDY

The IOC literature confirms that trust plays a critical role in mitigating perceptions of risk among project partners, because when a partner is trusted it is expected that they will behave in predictable

and mutually acceptable ways (e.g. to meet their contractual obligations, to perform according to promises, and to show goodwill towards the other partners; Sako, 1992, 1997; Sako and Helper, 1998). Trust also reduces transaction costs, by decreasing the need for project controls and contract-enforcement mechanisms, and it encourages risk-taking and the sharing of proprietary information – both of which are crucial in the largely unpredictable and uncertain area of R&D. It is generally accepted that trust, and especially the more resilient forms of trust that provide a basis for relationship continuity and goodwill (Ring, 1996), is built with repeated transactions through which partners prove themselves to be honest, fair, reliable, loyal, of high integrity, willing to reciprocate favours, and prepared to act in ways that go beyond formal agreements to benefit a partnership (Davenport et al., 1999; Dodgson, 1993; Daellenbach and Davenport, 2004).

But what happens when the partners have no prior experience of working together, where there are high levels of uncertainty about outcomes and the distinct possibility of partner opportunism? How under these conditions do partners manage their entry into collaborative ventures which would expose them to risk? Our review of the literature identified the construct of credible commitments – undertakings that bind partners to a collaborative relationship by ensuring that any gains achieved by staying in the relationship and meeting agreements exceed the gains that could be derived by defecting or acting to exploit the relationship – as being of some value in understanding how the risks of partner opportunism are addressed in the formation of R&D alliances (de Laat, 1997a, 1997b). The potential utility of this construct was also indicated in a case study of a highly successful cross-sector R&D collaboration involving a medical CRC (Couchman and Fulop, 2004a). In the case study it was found that credible commitments made by the partners, a division of a major multinational pharmaceutical corporation, a CRC and a government research agency, were regarded as central to the success of the collaborative project. The reciprocated and mutually-reinforcing commitments made prior to the initiation of the project included: resource pledging that reflected the relative size and stake of each partner in the project, with the company making the largest upfront financial contribution and the public sector partners contributing in-kind resources and facilities; the joint assignation of project intellectual property (IP); the free sharing of project information with an explicit agreement to have no

secrets or hidden agendas (delivered through an extensive information system and a management emphasis on team communication); and the establishment of “parallel track” sub-projects distributed among the partners to help ensure interdependency.

In the final phase of the study we developed a theoretical model to explain the effectiveness of cross-sector collaborative R&D projects, which we measured in terms of the collaboration experience of the partners (Couchman and Fulop, 2004b). In the model we proposed that relational trust was one of two major factors contributing to collaboration experience (we hypothesised that the more there was relational trust among the partners, the more positive would be their experience of the project) and that collaboration experience in turn was positively associated with more tangible outcomes such as acknowledged project success and the achievement of objectives. Based on our reading of the literature and our case study findings, we also postulated credible commitments as antecedent to relational trust, and hypothesised the more that credible commitments are made by the project partners, the higher will be the level of relational trust between them.

THE CONSTRUCT OF CREDIBLE COMMITMENTS

The origins of this construct are to be found in a classic essay on bargaining (Schelling, 1956). In this essay, which focused on bargaining tactics arising from expectations where “each party is guided mainly by his expectations of what the other will accept”, Schelling identified a class of effective tactic which involved one party making a sacrifice in order to achieve an outcome. This rested on the paradox that “... the power to constrain an adversary may depend on the power to bind oneself; that, in bargaining, weakness is often strength, freedom may be freedom to capitulate, and to burn bridges behind one may suffice to undo an opponent” (p. 282). Through these commitment tactics, bargainers can gain a desired outcome by credibly “tying their hands” and by so doing convince the other party of the mutual benefit in the outcome. As Schelling points out, this form of “incentive system” in bargaining was affected through an exchange of hostages in earlier times (the placing or taking of a valuable hostage ensured that the other side kept to an agreement). A contemporary example of this bargaining tactic is to pledge one’s reputation when making an agreement; any attempt to breach the

agreement could lead to serious damage to this reputation and so it represents an irreversible sacrifice binding the pledgee to the agreement. Credible commitments (mostly in association with Game Theory) have since become a core construct in institutional economics (e.g. Williamson, 1983), and the construct has been applied across a wide range of disciplines and topics, e.g. political theory (Slantchev, 2005), economic history (e.g. Greif et al., 1994), and employment relations (e.g. Abraham and Prosch, 2000).

In the area of interfirm relationships, the construct can help in understanding how robust cooperative relationships can be developed and sustained, given that the potential for partner opportunism creates an inherent instability. One way of deterring this opportunism is through *ex ante* undertakings (notably the making of credible commitments) for "... later problems can be mitigated by doing things differently at the 'front end' – that *ex ante* attention to structure can improve cooperative performance" (Parkhe, 1993: 795). Thus, credible commitments in interfirm alliances, as *ex ante* measures, which include transaction-specific non-recoverable investments, "... serve both to alter the pay-off structure, by increasing the cost of breaking an agreement, and to lengthen the shadow of the future, by signalling good faith intentions and long time horizons" (Parkhe, 1993: 800).

De Laat (1995, 1997a, 1997b) was the first to apply the construct of credible commitments to interfirm R&D alliances, and the first to explicitly link credible commitments to trust, so we drew on his theorisation of this construct. In his approach, he emphasised that through the use of credible commitments, partners provide tangible, waterproof guarantees committing them to faithfully execute an agreement (1997a: 160). Credible commitments thereby act as safeguards against partner opportunism and signal that a partner will remain trustworthy within a partnership. De Laat (1997a: 154 - 155) further distinguished between credible commitments that are "self-directed", in which a partner ties his/her own hands and binds him/her to the relationship (i.e. by making pledges), and those that are "other directed", which tie other partners to the relationship. He related trust and credible commitments by considering a situation of mutual vulnerability "where opportunistic abuse cannot be excluded" (1997a: 162). To overcome the problems of a lack of trust associated with this opportunistic

potential in R&D alliances, partners can use the instruments of “classical contracting” in an attempt to gain direct control over the other partners and/or they can create credible commitments either alone or in conjunction with contracting. Such commitments provide safeguards that help lead to a resilient, as opposed to a fragile, form of trust (Ring, 1996) where the former signals a desire for continuity of the partnership:

Partners voluntarily provide tangible investments which contribute to the prosperity of the co-operation. Such steps signal that they want it to become a success. This approach, therefore, clearly expresses high trust in the other(s). The consequences are straightforward: such strategic moves tend to create a spiral of rising trust. While communicating openly about and accepting each others' views on the matter in hand, partners loyally discharge their obligations, and are inclined to invest increasingly in the co-operative effort if required. Thus, the commitment approach not only effectively eliminates opportunistic dangers, its effects are much broader: it also tends to foster high quality co-operation. A real team spirit emerges. Such alliances will be optimally equipped to cope with external uncertainty and to adapt to changing circumstances over time. (de Laat, 1997a: 164)

In using this construct in our study, we were seeking empirical support for the proposition that credible commitments help project partners to manage relational risks and hence contribute to a positive collaboration experience. As we discuss below, relational risks are of several kinds and can only be managed if relational trust is established in a collaboration. The concept of credible commitments is especially applicable to situations where there is a high level of risk, the possibility of partner opportunism, and uncertainty of outcomes – all of which apply to commercially-oriented cross-sector R&D projects. Credible commitments are an important prerequisite for developing the trust that is critical to managing the relational risks of opportunism, such as partners appropriating proprietary knowledge, out-learning other partners or leaking information to competitors and thus, creating “boomerang hazards” that are common in many R&D collaborations (de Laat, 1997b).

In collaborative research projects relational risks can be seen as “vulnerability costs” that organizations need to prepare for as “...a premium for the risk involved in joining the collaboration” (Genefke, 2001: 26). In cross-sector collaborations vulnerability costs derive from two main sources: (a) structural dependence, and (b) information asymmetry, and these costs can be incurred whether the partners are competitors or not. Structural dependence occurs for example, when a partner contributes

a greater or lesser level of resources, expertise and personnel to a project than the other partners. De Laat (1997a) suggests that if credible commitments are to be effective then they should be mutually balanced, i.e. the commitments made by the partners should balance each other to create a situation of bilateral dependency “which effectively ties partners to each other” (p. 166). But bilateral dependence is difficult to achieve when there are significant structural imbalances making the matching of commitments well-nigh impossible and thus hindering the development of resilient trust. Further, it is hard to see how an appropriate or close enough balance of commitments could be achieved, but it should be easier between equal as opposed to unequal partners. This conundrum was born out by Barnes et al. (2002) who found that in cross-sector R&D projects involving university research centres, the industry partners generally preferred to play a supporting role on the periphery of projects (i.e. by providing technical support, specifications and expert knowledge) but did not want to do the research themselves thereby frustrating any possibility of bilateral dependence. While Barnes et al. (2002) conceded that industry partners tend to defer to the expertise of university researchers, they also found that a major attraction for companies participating in such projects was to conduct research that could not be justified in-house due to resource limitations and the risks involved (see also Santoro and Betts, 2002; Fulop and Couchman, 2006).

Information asymmetry occurs most often in cross-sector projects of the kind we studied when one partner has less opportunity to use or access intellectual property (IP) created from the collaboration and faces the possibility of losing competitive advantage and being exploited by others. Controlling and sharing IP is a major issue for all partners in such collaborations, but industry and public sector agencies (especially universities) have differing goals and missions in relation to IP and hence, perceive the risks and opportunities of exploiting it quite differently. Balancing widespread information dissemination with the need to withhold commercially or intellectually valuable information is a major challenge in cross-sector collaborations that requires innovative and inventive forms of agreements and commitments to make them work (Santoro and Betts, 2002). In R&D projects, information asymmetry is hard to manage in ways that are beneficial to all partners, and much harder if structural dependence favours one partner over the others. “Information dominance”

creates an unbalanced relationship of dependence leading to the possibility that the more vulnerable partner becomes a victim of opportunistic behaviour. Large companies often see their relationship with public sector partners in terms of “information gifts”, whereby the latter must offer something interesting in order to attract commercial commitments. However, de Laat (1997a: 165) suggests that sharing know-how and investing in common facilities establish a minimum level of trust that is generally necessary in almost all forms of transaction. Only more extended commitments, such as making financial commitments in advance, adopting a systemic approach, charging entry fees and instituting cross-shareholdings (in the sectors he studied) can lead to a spiral of rising trust.

De Laat (1997a) has argued that credible commitments can be used either on their own or in conjunction with contracts to facilitate the building of relational trust through developing norms of reciprocity that help overcome relational risks and encourage the sharing of IP. We argue that they might also help manage the structural and information asymmetries peculiar to cross-sector R&D collaborations. As a form of safeguard, such commitments are more than simple declarations or signals of commitment but, rather, they entail tangible actions binding a member to a potentially long-term relationship (Anderson and Weitz, 1992; Nooteboom, 1999). De Laat (1997a) described such commitments in terms of their relative costs to partners. A low cost non-equity form, for example, is that of establishing protocols for sharing valuable or commercially-sensitive information relating to IP, which constitutes a form of pledging. Other lower level credible commitments include, for example, the development of systematic approaches to the organization of projects and an undertaking to make phased financial or resource commitments to a project, these being forms of economic hostage taking. Higher or extended levels of commitment identified by de Laat (1997a) are those involving more costly and idiosyncratic safeguards that are harder to undo, and such undertakings include: joint equity in projects, the sharing of royalties, advanced investments from larger partners made before a project commences, the larger partner contributing a higher proportion of funds, and specific upfront contributions (of equity or resources) that bind partners to a project and help offset problems with reciprocation and dependency.

Credible commitments provide safeguards that can lead to a spiralling build-up of trust, which arises as partners create a track record of successfully executing their commitments. They therefore help build relational trust, especially that which we have described as “goodwill trust” (very close to the notion of “resilient trust” advanced by Ring, 1996). More importantly, credible commitments also act as a form of “enforceable trust” by setting the norms of compliance as well as the sanctions for breaches of agreed commitments, and hence involve the reputation considerations of project participants (Anderson and Weitz, 1992; Gulati, 1995; de Laat, 1997a).

THE SURVEY OF CRC PROJECT LEADERS

The survey was conducted to test the theoretical model that we had proposed to explain partner collaboration experience. Our first step was to design the survey instrument, and an initial task in this was to develop a measure of credible commitments.

Measuring Credible Commitments in CRC Projects

One form of credible commitments has previously been measured in an empirical study of business-to-business relationships by Anderson and Weitz (1992). They treated these as “idiosyncratic investments” - a type of pledging which, along with specific contractual terms, seeks to bind partners to a relationship (see also Nooteboom, 1999: 95 - 96). Such idiosyncratic investments are “... specific to a channel relationship. They are difficult or impossible to redeploy to another channel relationship; therefore, they lose substantial value unless the relationship continues” (Anderson and Weitz, 1992: 20). Through this form of pledging, a collaboration partner “ties their own hands” by constraining their own room for manoeuvre (it will cost them to withdraw or otherwise act opportunistically to the detriment of the collaboration) and in doing so, it strengthens the relationship by sending a strong signal of commitment. Anderson and Weitz (1992) operationalised this construct in terms of two sets of multi-item scales (for self-reported idiosyncratic investments and partner perceptions of the idiosyncratic investments) which measured the “... level of investment in the relationship by [the parties] and the degree to which those investments are not redeployable to other relationships” (p. 23). The idiosyncratic investments identified in their scale items included investments in dedicated

personnel, customer training in the use of the manufacturer's product, and investment in dedicated facilities. The context and focus of this approach were quite different from those of our study. Anderson and Weitz (1992) were concerned with dyadic relationships within a distribution channel (i.e. between a manufacturer and distributor), a quite different form of relationship than that amongst three or more organizations engaged in an R&D collaboration.

In our study we defined credible commitments more broadly as undertakings made by the partners in a collaborative relationship, in the form of contractual obligations and/or other agreements, "tying the hands" of themselves and/or the other partners, through pledges which incur non-recoverable or partly-recoverable costs or through the incorporation of penalties into an agreement, thereby ensuring that any gains achieved from keeping to the agreement would exceed those from defecting, and so binding the partners as well as signalling their commitment to the relationship. We were interested in the extent to which such credible commitments were made by the partners to a CRC R&D project, as indicated by the sum of possible commitments actually made by one or more partners. In this approach, each type of credible commitment could either have been made or not as the case may be (it did not make sense to us to measure the extent to which it had been made either by using a frequency scale or an agreement/disagreement scale in response to a scale item describing a credible commitment), and each was seen as an independent and equally-weighted act.

To create the measure we listed seven items that included both high and low levels of the credible commitments as described by de Laat (1997a) and as identified in our case study (examples of pledging included the commitment to share proprietary or commercially-sensitive information and an agreement to share in any intellectual property created by the project, while more extended forms of commitment included an undertaking to invest in further development of project outcomes and an agreement to take equity in any joint venture arising from the project). We then used the binary responses to the items on this list to create a single numerical scale of 0 - 7 commitments made by the collaboration partners in a project; at one end of this scale the partners had made none of the credible commitments and at the other end the partners had made all of them. In formulating this single-item

measurement scale we were mindful of the limitations of such an approach (including their limited capacity to fully capture complex constructs, their lack of precision, and above all the difficulties in statistically assessing their psychometric properties), but considered that this was most appropriate for our study in which the construct was employed in an essentially exploratory way.

Survey Methods

A questionnaire was designed to collect the data required to test our theoretical model. The seven constructs in the model were operationalised, and wherever possible this was achieved by using and/or modifying existing scales. The resulting draft questionnaire was pilot tested and then modified in response to the feedback received. The final questionnaire consisted of 19 items, nearly all of which were closed questions with most requiring a response on a 6-point agree/disagree scale. In completing the questionnaire, respondents were asked to focus on the CRC project that they had most recently completed (or were about to complete) as project leader in the last two years. The sampling strategy was designed to access a target population which was defined to be: CRC project leaders who had completed (or were soon about to complete) a CRC project that had been established with the intention of leading to some financial benefit (e.g. in the form of income or cost savings) for the CRC and/or at least one of its partners. The initial sampling frame of 456 potential respondents in selected CRCs (i.e. those most likely to be engaged in commercially-focused R&D and covering 5 of the 6 CRC sectors) was derived from publicly-available sources (e.g. CRC annual reports and websites, reports in the mass media, etc.), and this was later supplemented with a further 85 possible respondents making a total of 541 potential respondents in the mail-out covering all 6 CRC sectors. The survey questionnaires were mailed out in April 2005, and after a number of reminders the survey period was closed in September 2005. From August 2005, respondents were given the option of responding to the questionnaire via the web. Data were entered into an SPSS data base, and the resulting file was cleaned up to remove anomalies and data entry errors. Analysis of the data was initially conducted using SPSS for Windows (v. 12.0.1), and structural equation modelling was carried out using PLS Graph version 3.0 (Barclay et al., 1995; Chin, 1998a, 1998b).

Key Survey Findings

At the end of the survey period, a total of 165 completed or partly-completed questionnaires had been returned by eligible respondents (the response rate was 51% taking into account 215 ineligibles in the mail-out). Of the 165 returned questionnaires, 9 had too much missing data and so were discarded as insufficiently complete leaving a usable sample of $n = 156$. The respondents were a diverse cross-section of CRC project leaders, with nearly one-half employed in a university, 19% from CSIRO and 18% from other research organizations. They were reasonably experienced project leaders, with 81% having 3 or more years leadership experience and 58.2% having led 2 or more CRC projects to completion. The sampled projects covered a broad range, and a “typical” project contributed to one of four CRC sectors, expected to produce new technology, new products and/or new processes, had around 4 collaborating organizations (with at least 1 university and 1 industry partner), employed a total of 6 personnel, had a budget of less than A\$1 million and a scheduled life of up to 2 years, had partners with little or no experience of working together but who made 2 credible commitments to the venture and remained in the partnership for the duration of the project, and was seen to be of some risk in terms of achieving the goal of a financial return on the investment in the research.

In 89% of the projects the partners had made at least one of the listed credible commitments and the maximum number made was all of the 7 listed. On average 2 credible commitments had been made per project, and the distribution of total commitments made was positively skewed with 1 – 3 commitments being made in 81% of the projects. The credible commitments made in the sampled projects were as shown in **Table 1**. The three most widely employed credible commitments were an agreement to share proprietary or commercially-sensitive information during the project (63%), an agreement to jointly assign or equally share any project IP (56%), and an undertaking to invest in further development of project outcomes (36%). Given that we used a single item scale to measure credible commitments, we could not assess the psychometric properties of this scale using accepted statistical methods.

The PLS Graph analysis of our model provided support for the hypothesis that there is a positive association between relational trust and credible commitments (path coefficient = 0.302, $t = 3.44$, $p < 0.01$), but no support for the hypothesis that there is a positive relationship between credible commitments and trust (path coefficient = -0.070, $t = 1.42$, $p = 0.16$). We also found that collaborative experience was significantly and positively associated with more tangible measures of project success (e.g. there was a highly significant correlation coefficient of 0.637 with acknowledgement of project success).

Table 1: Credible Commitments Made by the Project Partners

Credible Commitment	% Cases (n = 156)
Agreement to share proprietary or commercially sensitive information during the project	63
Agreement to jointly assign or equally share project IP	56
Undertaking to invest in further development of project outcomes	36
Agreement to take equity in any joint venture arising from project	23
Exclusive partnership formed among partners for future projects	9
Industry partners agreed to license back IP to project partners	9
Industry partners guaranteed to purchase project outputs	7

DISCUSSION AND CONCLUSIONS

In our study we have shown that credible commitments do play an important role in the building of effective inter-organisational collaborations, and we have confirmed the findings of other studies that trust contributes to collaborative venture performance (e.g. Mohr and Spekman, 1994; Rousseau, et al., 1998; Dyer and Chu, 2003; Bstieler, 2006). 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 monitoring, and through such mechanisms reduces transaction costs and perceptions of risk (Nooteboom 1999). However, the relationship between credible commitments and trust appears to be more complex than we hypothesised, and one conclusion from our study is that the measurement of this construct requires further theoretical development. It should be emphasised that, in this study, we have extended the application of the construct in three ways, i.e. we have applied it to multi-lateral relationships, at the project level, and to cross-sector collaborations, and this contrasts with its more usual application in dyadic interfirm situations. So in the context of our study, what was a seemingly simple construct with

general application in cooperative relationships was actually quite complex in its method of application and efficacy.

The lack of support for our hypothesis that there is a positive association between the making of credible commitments and relational trust, could be due to either the specific context of our study (i.e. cross-sector projects within the Australian CRC Programme) or to the nature of the credible commitments that were made in the sampled projects and the way that we measured them. Our study projects involved public sector organisations which are less likely to act opportunistically than their private sector counterparts, and the relationships in these projects were mediated by a third party, the government-sponsored CRCs, which could play the role of “honest broker”. The situation differs markedly from that of the inter-firm collaborations referred to by de Laat (1997a), wherein the partners may often be actual or potential competitors. In this latter situation, the potential for opportunism is much greater and almost inevitable as is the risk that this poses for the partners, so the role of credible commitments is clearly indicated. In the context we have studied, by contrast, credible commitments may not be as important, there may be different interpretations of what constitutes a credible commitment or even different valuations of the various types of credible commitment, and other factors – such as partner reputation – may be more decisive. What we might also find more common in CRC-type collaborations is the propensity for cheating weakly, which is akin to such things as meeting minimal obligations rather than active acts to damage an alliance (de Laat, 1997a: 148). Further, following Burchell and Wilkinson (1997) we would argue that the institutional context of the CRCs plays an important role in the building of collaborative relations among the partners. CRC projects are initiated only after intensive negotiations which culminate in a formal project agreement among the partners. This agreement has the force of a legal arrangement, in that it is binding on the partners across a wide range of project areas (e.g. the disposition of any intellectual property created, the allocation of tasks and resources, the project’s governance mechanisms, etc.), and as such may “... lend special assurance to particular expectations and make them sanctionable... [and] lessen the risk of conferring trust” (Luhmann , 1979: 34).

The nature of effective credible commitments also requires further consideration, and two issues are pertinent here. The first is that of managing asymmetries (e.g. of financial power and knowledge) in relationships and creating mutual dependence among collaborators. According to de Laat (1997a: 166) for credible commitments to be effective they need to be mutually balanced: "...to promote enduring cooperation, credible commitments by partners should balance each other. Such an arrangement creates bilateral dependency, which effectively ties partners to each other." This raises a wide range of questions, not least of which is what a "balance" actually means in different contexts, but we did not investigate this in our study. This aspect of credible commitments could well be a major factor determining their efficacy in building trust and so therefore needs to be incorporated in their measurement. The second issue is that of "more extended commitments", those which involve substantial investments or undertakings that are seen to be of considerable value, for "...it is only when more extended commitments are made ... that the spiral of rising trust is set in motion" (de Laat, 1997a: 165). These types of credible commitment act as effective safeguards that initiate the process of rising trust, in contrast to other commitments that only appear to indicate the establishment of a minimum level of trust. It should be noted that in our study, most of the commitments actually made were either those of a lesser kind, and the more extended credible commitments (e.g. an exclusive partnership was formed among the partners for future projects, and the industry partners guaranteed to purchase project outputs) were not so common, which may have contributed to our findings. Clearly, this dimension of depth of commitment also needs to be incorporated in a measure of the construct.

We conclude by emphasising that with this study we have merely opened up a research agenda and it is clear that further studies are required to clarify the nature and role of credible commitments in a range of collaborative contexts. Two main areas where research would improve our understanding and provide a more developed theoretical basis for measurement are (a) on the role of partner reciprocation and the balancing of commitments in determining the efficacy of such acts (notably in multi-lateral situations), and (b) on the role of opportunism and the associated partners perceptions of risk in different types of collaboration (and especially in cross-sector collaborations).

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