Challenges of eCollaboration among SMEs

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Challenges of eCollaboration among SMEs

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Abstract
The challenges of eCollaboration for SMEs start with the decision to collaborate, and continues with the incorporation of enabling web technologies. This paper focuses on factors that influence eCollaboration by studying two collaborative groups, one in the toolmaking industry and one in the IT industry. Results indicate the need for an additional factor of independent facilitation and coordination, as well as a higher level of priority to be given to the time taken to build trust. Also, a team workspace to manage the process, alongside a web portal to manage the collaborative projects is recommended. The notion of SMEs collaborating with each other when previously they may have been competitors indicates a change in the way business is perceived.

Keywords: collaboration, eCollaboration, SMEs

1 Introduction
Organisations are now looking beyond transforming their businesses into eBusinesses. With the use of web technologies, organisations are planning to further change their business processes to include linkages with business partners. In today’s global marketplace, small and medium enterprises (SMEs) are becoming involved in collaborations to grow their businesses and leverage opportunities offered by emerging technologies.
Challenges of eCollaboration among SMEs

This paper details outcomes from two projects that examined factors that influence collaboration among SMEs in two industry sectors, and outlines the development of strategies for successful eCollaboration.

Collaboration is an effective way to work and is a relationship between two or more organisations to achieve a common goal (Mattessich et al, 2001). The term eCollaboration extends collaboration with the use of information and communication technologies (ICT) (Kock & D’Arcy, 2002). Collaboration can also encompass the notion of a virtual enterprise, which may consist of temporary alliances between organisations to share skills and resources in order to respond to business opportunities (Camarinha-Matos & Afsarmanesh, 2004).

The use of technologies for collaboration offers organisations the potential to improve their business processes, reach new markets and reduce costs. Like previous research into the diffusion process, organisations need to face a number of issues in addition to the adoption of the enabling technologies. Many research studies into adoption of eBusiness technologies have identified this aspect (for example, see Lawson et al, 2003), and the same argument can be applied to eCollaboration. The view that the technologies are tools to support eCollaboration is the focus taken in this paper. For collaboration to be successful at a business level, the non-technical challenges need to be addressed. Certainly, the technologies are available to support collaboration, but successful eCollaboration has not yet reached the potential offered by the technologies. Rogers’ (1995) theory into diffusion of innovation states that adoption follows on from success stories of early adopters, and focuses on the characteristics of relative advantage, compatibility, complexity, trialability and observability.

Collaboration to form temporary or permanent business alliances moving towards the concept of a virtual enterprise is a necessary path for the future of SMEs in some industry sectors. For example, SMEs in the toolmaking industry are beginning to collaborate to survive and be competitive amidst trends in the industry that have seen toolmaking jobs go outside Australia (Lawson et al, 2005).

In order to exploit the virtual enterprise concept that eCollaboration promotes, a framework is needed with mutual agreements covering common standards, procedures and intellectual property rights, which are ready to use before a joint project is started (Zwegers et al, 2003). The number of organisations collaborating is determined by the project and the skills and resource base needed. A common ICT platform is desirable to shorten lead times and allow different sized organisations to collaborate (Bremer et al, 2000).

The most challenging aspects of collaboration involve the non-ICT components such as communication, information sharing, culture, change management, training (Vakola & Wilson, 2004), and trust (Thoben & Jagdev, 2001; Schuster, 2002). Perceived interaction qualities, both interpersonal and technological are vital to developing trust, as is satisfaction with the collaboration process (Hol & Lawson, 2004). Indeed, Boddy et al (2000) have identified that making the decision to work collaboratively is easier than the implementation. Certainly, without an established support framework it is likely that the collaboration would not be successful.
2 Collaboration

Mattessich et al (2001) identified the following factors as being essential for successful collaboration:

- **Environment:** history of collaboration, collaborative group seen as a leader in the community, favourable political and social climate.

- **Membership Characteristics:** mutual respect, understanding and trust, appropriate cross section of members, collaboration viewed by members as in their self interest, ability to compromise.

- **Process and Structure:** members share a stake in process and outcome, multiple layers of participation, flexibility, development of clear roles and policy guidelines, adaptability, appropriate pace of development.

- **Communication:** open and frequent communication, established informal relationships and communication links.

- **Purpose:** concrete, attainable goals and objectives, shared vision, unique purpose.

- **Resources:** sufficient funds, staff, materials and time, skilled leadership

Kock (2005) asserts that eCollaboration consists of the following elements and these are relevant to the groups studied for this research.

- **The collaborative task:** A task that the parties can work on together. For example, jobs beyond the capacity of one organisation, or jobs that require complementary skill sets;

- **The eCollaboration technology:** Existing or new IT infrastructure such as teleconferencing, discussion boards and instant messaging.

- **The participants:** Organisations that are collaborating, industry associations and government agencies. Characteristics of the participants and size of the group can also have an effect on the collaboration.

- **Mental schemas of the participants:** The knowledge and experience of the participants and the degree of similarity between participants. For example, expert or novice understanding of the task.

- **The physical environment:** The location of the participants. For example, the geographical location of the toolmakers was dispersed and therefore they needed to apply more effort to eCollaboration, whereas the IT organisations were within the same geographical area;

- **The social environment:** the perceptions of trust and the behaviour among the participants as well as peer pressure among participants.

Ginige (2004) argues that organisations with the same capabilities can collaborate to gain advantage by acquiring jobs beyond the capability (in size and/or complexity) of a single organisation. Collaboration can be competitive (same skill set) or complementary (different skill set). Ultimately, what is important is gaining the competitive advantage by increasing market share and lowering costs, and therefore maximising profit and return on investment.

The technology and methodology utilised for eCollaboration enables the main objective to be achieved in a seamless, user-friendly and cost-effective way (DeZoysa, 2001). Trust between participants is a key factor to enable the project’s goal to be achieved (Beckett, 2005). Saunders et al (2004) argue that the time factor in relation to building trust is not properly considered, and asserts this gap is not taken into account when researching eCollaboration between organisations.
Trust

Saunders et al (2004) argue that trust is complex and multi-dimensional, and identify a number of elements in building trust, such as the willingness of stakeholders to take the risk, but warn that the possibility of opportunistic behaviour can increase the risk of negatively impacting on the relationship.

Trust is generally focussed at the individual level; however it is often projected to the group level with cooperation, credibility, openness, benevolence, integrity, predictability, integrity and competence (Saunders et al, 2004). Within groups, opportunism is almost always assumed to be present, and it is argued that it is a legitimate concern (Kumar et al, 1998). In a B2B inter-organisational relationship, a partnership will generally be built on sharing expertise to reduce costs (Jones & Bowie, 1998).

In a virtual enterprise setting integrity is viewed as an important element of trust (Byrne, 1993). Standards in ICT, which enhance effective communication contribute to integrity and therefore build trust in inter-organisation relationships (Jones & Bowie, 1998). Competence is another element of trust (Ratnasingam, 2001) and stakeholders need to be convinced of a partner’s technical knowledge, skills and credibility before embracing eCollaboration. Predictability offers the potential of trust and is used as a control mechanism. Certainly, higher levels of trust reduce the need for highly complex control systems, such as contracts (Kumar et al, 1998). Of course, not all potential risks can be foreseen and the need for contracts is ever present to protect participants.

Gallivan and Depledge (2003) argued that the need for trust and the level of trust are two distinct factors. When considering collaboration, the stakeholder determines the existing level of trust (based on factors like culture, industry context, type of partnership and nature of collaboration). If the need for trust is lower than the level of existing trust, then collaboration can proceed. Conversely, if the need for trust is higher than the level of existing trust, then trust needs to be increased between the stakeholders. Lower levels of trust mean that more control is necessary and the use of formal contracts and agreements is paramount. To heighten and maintain trust within a collaborative venture, a continuous integrated process of obtaining new knowledge, open communication and information sharing is necessary to promote further collaboration (Akkermans et al, 2004).

Probably the most important factor in the development of trust is time along with the aspects of openness, benevolence, integrity and predictability as argued by Saunders et al (2004). Longer term collaborations, such as supply chain relationships can benefit from time, however, the more temporary relationships of virtual enterprises can only focus on short-term collaborations where time to develop trust is dramatically shortened. Another factor in developing trust is when only partial information is available. Cahill et al (2003) state that trust is not visible and is implicit in society, and argue that trust is inherently linked to risk.

Trust has been researched in areas such as economics, sociology and politics and while the importance of trust is acknowledged it is seldom examined (Gambetta, 2000). Trust is generally context specific, so trust in one situation does not directly translate to trust in another situation, but does present the proposition that context is necessary (Cahill et al, 2003). In the context of eCollaboration trust is necessary between participants as there is some level of risk involved. As risk increases, the need to establish levels of trust also increases.
To further examine the challenges faced by SMEs engaged in eCollaboration, the factors of the task, the technology, the participants, the mental schemas of the participants, and the environment (Kock, 2005) were examined with two separate collaborative groups. Trust was a significant challenge that emerged in the first study within the toolmaking industry, and was subsequently made a priority in the second study within the IT industry.

3 The Study
A qualitative study of two eCollaboration projects involving SMEs was undertaken to identify factors that influence the success or otherwise of collaboration. One group consisted of four SMEs, with limited ICT experience and no web sites, in the toolmaking industry. These SMEs were previously competitors and collaborated to increase their capabilities. The industry association involved in the collaboration was Austool Ltd. The other group consisted of twelve SMEs, with extensive ICT experience with web sites, in the IT Industry that collaborated to increase their market share. The industry association involved in this collaboration is the Western Sydney IT Cluster (WSITC) from the Department of State and Regional Development (DSRD). The SMEs had complementary skill sets, with a few previously being competitors.

These two projects form part of a wider research program, and represent studies undertaken with industry partners. Outcomes of the toolmaking collaboration conducted in 2005 were incorporated into the IT collaboration project in 2006. Techniques of questionnaires, interviews and observations were conducted. The researchers also acted as participants in the collaboration during face-to-face and electronic meetings.

Toolmaking is part of the Manufacturing sector in Australia and consists of over 600 organisations. Most of these organisations are SMEs with less than 50 employees (ABS, 2004). Collaboration is essential in the toolmaking industry to overcome the increase in imported tooling (Austool, 2004). The participating SMEs had less than 10 employees.

The ICT Industry in Australia consists of over 23,000 companies, with 80% employing less than five staff. Most of these organisations are in computer consultancy services, with computer wholesalers and telecommunications companies represented (ABS, 2004). Collaboration is viewed as necessary to overcome threats from overseas companies and to increase their market share (DSRD, 2006). The participating SMEs had less than 20 employees.

4 Results
Results from the two research studies that address the objectives of this paper are presented below.
4.1 Analysis of Success Factors for eCollaboration from the Literature

<table>
<thead>
<tr>
<th>Factor</th>
<th>Toolmaking Industry Competitive Collaboration</th>
<th>IT Industry Complementary Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Task</td>
<td>Informal arrangements between participants for a number of projects</td>
<td>Trial projects formally established with coordinators from the wider group</td>
</tr>
<tr>
<td>eCollaboration Technology</td>
<td>Phone, fax and email</td>
<td>Email and web-based collaborative tools for the trial projects</td>
</tr>
<tr>
<td>Mental schemas of Participants</td>
<td>Same level of knowledge, experience and expert understanding of the tasks.</td>
<td>Varying levels of knowledge, experience and understanding of tasks.</td>
</tr>
<tr>
<td>Environment</td>
<td>Geographically dispersed. No history of collaboration.</td>
<td>Located within one region. Some history of informal collaboration.</td>
</tr>
<tr>
<td>Member Characteristics</td>
<td>Mutual respect but not high level of trust between SMEs or with researchers. Trust was evident with industry association (Austool).</td>
<td>Some level of respect and trust with some SMEs. Trust evident with industry association (WSITC) and researchers.</td>
</tr>
<tr>
<td>Multiple Layers of Participation</td>
<td>SMEs participated at same level, but no clear roles and guidelines were evident</td>
<td>SMEs participated at different levels, with some guidelines and flexibility</td>
</tr>
<tr>
<td>Communication</td>
<td>Communication was open but not frequent, and relied on the researchers. Informal relationships were slow to develop.</td>
<td>Communication was open and frequent with face-to-face meetings, trial project sub-meetings, email exchanges, online discussion and eMeetings.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Shared vision took time to develop. Informal projects were successful.</td>
<td>Shared vision and goals evident from beginning of collaboration.</td>
</tr>
<tr>
<td>Resources</td>
<td>High levels of expertise in toolmaking evident. Funding and time specifically to develop collaboration was low.</td>
<td>Time, staff and materials to develop collaboration evident from beginning of collaboration. Funding was at lower level.</td>
</tr>
<tr>
<td>Leadership</td>
<td>Industry association declined any coordination and facilitation role.</td>
<td>Industry associated championed the collaboration.</td>
</tr>
<tr>
<td>OUTCOMES</td>
<td>Some success on an informal basis. Commitment to collaboration is continuing</td>
<td>Commitment levels to collaboration are high. Contribution by most members is also high.</td>
</tr>
</tbody>
</table>

Table 1: Factors applied to the two collaboration groups

Table 1 shows that the IT eCollaborative group was more cohesive and embraced the technologies to communication to take ownership of the process. While both groups were highly motivated to collaborate, it was the knowledge and experience within the IT group, despite varying levels of understanding of project tasks, that established levels of trust much earlier that the toolmaking group. The IT group was also more willing to devote resources, particularly time to collaborate. As expected the physical environment was not an issue due to the use of technologies. One very remarkable difference was the commitment of the industry association. Austool was not prepared to devote time to provide a leadership role, whereas WSITC were very involved from the start of the project.
4.2 Investigation of Factors present in the Toolmaking eCollaboration:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Toolmaking Industry Competitive Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Slow to develop on own initiative. Researchers took steps to involve toolmakers in web-based projects.</td>
</tr>
<tr>
<td>Time</td>
<td>Time to develop trust was highlighted as a factor to be addressed early in the collaboration. Meetings were generally at night. Time to participate in the collaboration process was also an issue, with day-to-day activities taking priority.</td>
</tr>
<tr>
<td>Facilitation and Coordination</td>
<td>Acknowledged as a primary factor in collaboration. Austool declined to take a leadership role.</td>
</tr>
<tr>
<td>Structure</td>
<td>Attempts at developing roles and policies by researchers were resisted by toolmakers, who preferred informal arrangements.</td>
</tr>
<tr>
<td>Guidelines</td>
<td>Toolmakers referred all matters to the researchers rather than take ownership of the process.</td>
</tr>
</tbody>
</table>

Table 2: Primary Factors in the toolmaking collaboration

Table 2 reveals that the factor of *Time to develop Trust* was not identified until well into the project, which resulted in the project’s timeline being extended on a number of occasions. Likewise, the lack of Leadership by Austool compounded the problems associated with Structure and Guidelines.

4.3 Examination of the impact of identified factors from the toolmaking collaboration on the IT collaboration:

<table>
<thead>
<tr>
<th>Factor</th>
<th>IT Industry Complementary Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Steady development of trust with some participants more willing to acknowledge trust as being necessary between participants. Initiatives to build trust were established by WSITC.</td>
</tr>
<tr>
<td>Time</td>
<td>Meetings were scheduled early morning to allow development of the collaborative process, and so keep the day free for business activities.</td>
</tr>
<tr>
<td>Facilitation and Coordination</td>
<td>WSITC took a major role in facilitating and coordinating the collaboration.</td>
</tr>
<tr>
<td>Structure</td>
<td>Support framework and documents (short and not too formal) were developed by researchers with input and feedback from participants.</td>
</tr>
<tr>
<td>Guidelines</td>
<td>Participants referred matters to each other, circulated the group and took ownership of the trial projects.</td>
</tr>
</tbody>
</table>

Table 3: Primary Factors from the toolmaking collaboration applied to the IT collaboration

Table 3 highlights the need to address the building of Trust by scheduling of meetings and networking opportunities for the group. Also, a major contribution by the industry association decreased the problems experienced in the toolmaking group, particularly related to Structure and Guidelines.

<table>
<thead>
<tr>
<th>Factor</th>
<th>IT Industry Complementary Collaboration</th>
</tr>
</thead>
</table>
| Goals of individual organisations | Undertake larger projects
Access complementary skill sets
Overcome periods of down time |
| Goals of collaborative group  | Group marketing
Recognition of group as leader in eCollaboration
More business |
Challenges of eCollaboration among SMEs

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Expertise and knowledge in IT industry</th>
<th>Strong industry association</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaknesses</td>
<td>Marketing</td>
<td>Lack of consistent work flow</td>
<td>Some skill sets missing</td>
</tr>
<tr>
<td>Opportunities</td>
<td>Effective marketing</td>
<td>Access to increased capability</td>
<td>Export opportunities</td>
</tr>
<tr>
<td>Threats</td>
<td>Trust and honesty between participants</td>
<td>Marketing getting ahead of capability</td>
<td>Theft of Intellectual Property (IP)</td>
</tr>
<tr>
<td>Possible Strategies for eCollaboration</td>
<td>Complementary and Competitive collaborations</td>
<td>Web Portal for eCollaboration group</td>
<td>Trial projects to identify issues</td>
</tr>
<tr>
<td>Issues identified by the group</td>
<td>Trust in working together</td>
<td>Knowing each other’s strengths</td>
<td>Protection of IP</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Cohesive group built on respect and trust</td>
<td>Effective communication using eCollaboration tools</td>
<td>Committed facilitation by industry association</td>
</tr>
</tbody>
</table>

Table 4: Analysis of the IT collaboration

Table 4 details the analysis of the IT group, which has similarities to the toolmaking group, such as group marketing, ability to undertake larger projects and to attract new customers and new markets. The major difference between the groups is the IT groups’ goal of being a leader in eCollaboration and seeking recognition from the wider community.

4.4 Development of Strategies for successful eCollaboration among SMEs:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Establishing Successful eCollaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitation and Coordination</td>
<td>Essential for involvement of an independent association</td>
</tr>
<tr>
<td>Commitment of Participants</td>
<td>Contributions by members ideally in same regional area</td>
</tr>
<tr>
<td>Characteristics of Members</td>
<td>Similar ability for flexibility and compromise. Experience can vary between expert and novice</td>
</tr>
<tr>
<td>Structure</td>
<td>Degree of ownership of the collaboration process Agreed support framework (working documents)</td>
</tr>
<tr>
<td>Guidelines</td>
<td>Clear roles for participants (Coordinator, member) eMeeting protocols</td>
</tr>
</tbody>
</table>

Table 5: Framework for eCollaboration

Table 5 outlines a framework for successful collaboration for SMEs, which is drawn from the analysis of the two groups. The Support Framework developed by the researchers with input and feedback from participants include:

- Memorandum of Understanding
- Confidentiality Disclosure Agreement
- Terms of Agreement
- Service Level Agreement
- eMeeting Protocols
- Strategies for development of an eCollaboration group.

Participants in the IT collaboration did not want long jargon-filled legal documents, but live straight-forward documents that could be used in various collaboration projects.

Analysis of the collaboration process in both projects demonstrates the need for high-level facilitation and coordination by an independent association, the utilisation of web technologies to create an eCollaboration framework with a group workspace and a web portal to manage the process, as depicted in Figure 1.

![Figure 1: Model for the process of eCollaboration](image)

Figure 1 shows the entry point to the eCollaboration Group through the website of the industry association or via a public web portal. The eCollaboration web portal has a public area where general information about the eCollaboration group is detailed (Mission and Purpose, Marketing, Capability, Success Stories, Who’s Who, Newsletter) as well as interactivity features for interested parties to join the group. The secure login area is for members of group. Members can access this protected area to list or join projects and information is about Companies (capability, contact information), Projects (proposed, current and completed), Calendar (company availability, links to member websites, links to proposed projects), Discussion Forum (Public to the group, Private to a project), Document Repository (Working documents), and Links (Websites for tenders, government, market research).

The Model also shows the eCollaboration Team Workspace, which is a separate area that deals with the process and structure of the collaboration. Features of this...
area include a Discussion Forum for proposed policies and procedures, working documents before they are released to the Web Portal, and eMeetings. The Team Workspace satisfies the collaboration factors of Process and Structure, Communication and Purpose as outlined by Mattessich et al (2001). The Web Portal satisfies the eCollaboration factors of the collaborative task, the technology, the participants, and the environment as detailed by Kock (2005).

As can be seen the Model separates the process of eCollaboration from the actual collaboration on work projects, and thus creates another factor for successful eCollaboration.

5 Discussion

Outcomes of the analysis of factors influencing collaboration from the literature when applied to the two groups found that some factors were more relevant that others. For the toolmaking and the IT collaborative groups the factors of the Collaborative Task, Member Characteristics, Purpose and Time were significant. The factor of Leadership and independent facilitation was positively significant to the IT group, and negatively significant to the toolmaking group.

The findings from the toolmaking group of Time to build Trust, Leadership, Structure and Guidelines were addressed by the researchers at the start of the IT group in consultation with the industry association. Subsequent findings from the IT group confirmed findings from the toolmaking group that the identified factors from the literature need an additional element of Facilitation and Coordination for collaboration to be successful as shown in Figure 1.

Awareness of Trust as a factor has been evident in the literature; however, more detailed investigations are needed with collaborating groups to ensure that this factor is given sufficient emphasis. From the two groups detailed in this paper, techniques of focussed conversations, documentation, frequent and open communication and trial projects enable the building of trust and the ability of participants to show competency and reliability.

Independent facilitation and coordination is essential to provide a context and a pre-prepared base for SMEs to participate in collaboration. Industry associations are ideally placed to take on this responsibility. Ultimately, the goal of eCollaboration is to meet the needs of a wider customer base, which in turn makes individual SMEs more profitable.

The IT collaborative group’s goal of becoming recognised as a leader in eCollaboration is still to be realised, however it will serve as a success story to encourage more SMEs to adopt the necessary technologies. The characteristic of observability from the Diffusion theory (Rogers, 1995) would be achieved.

Future research can include more studies of collaboration within different industry sectors, across industry sectors, and types of collaboration (complementary and/or competitive). Also, the framework outlined in this paper could be used with a view to modification and extension.

6 Conclusion

This study confirms the factors previously identified for eCollaboration, namely the collaborative task, eCollaboration technology, participants, mental schemas, and the environment. In addition, the following contributions are made:
- the need for a higher level of priority to be given to the building of Trust;
- the incorporation of a Team Workspace into eCollaboration technologies that deals with the process of collaboration; and
- the inclusion of a new factor of independent Coordination and Facilitation.

SMEs face a number of challenges in participating in eCollaboration, from finding collaborating partners to successfully working with them to achieve a common goal. Certainly, making the decision to collaborate is much easier than the actual operation of participating in a joint project. Ultimately, it is up to the individual SME to change the mindset from viewing other organisations as competitors to viewing them as possible collaborators.
References


