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Socio-technical factors influencing channel use for knowledge-sharing in regional SME networks

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Abstract: The economic sustainability of regional areas is dependent on cross-industry innovation and knowledge-sharing among small and medium enterprises (SMEs). The web-based initiatives deployed in regions worldwide to facilitate SME knowledge-sharing have typically been unsuccessful. This paper argues that the main reason for these failures is the lack of understanding of the socio-technical factors which influence the use of web-based channels (websites, online forums and expertise databases) as well as the more conventional channels (face-to-face and email). The paper reports the findings of interpretive case studies of two regional SME business networks. It evaluates the major channels on six socio-technical criteria: link strength; trustworthiness; tacitness; usability; durability; and currency. None of the channels were strong against all socio-technical factors. This highlights the importance of achieving an appropriate mix of channels to facilitate SME knowledge-sharing.

Keywords: knowledge-sharing; knowledge management; virtual communities of practice; small and medium enterprise; SME; Australia; small firm; socio-technical; business network; channel; communication; web; email; regional development

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1 Introduction

Networking and knowledge-sharing among businesses is an effective way of promoting business development. It is a particularly important issue for Small and medium enterprises (SMEs) whose flexibility, willingness to take risks, and positive employment activities have also emphasised their contribution to innovation (Floyd and McManus, 2005). This is facilitated when they form into local networks clustered around an industry, and share skills, resources and capabilities in coopetitive relationships where competition and cooperation coexist. SME networks are particularly important in regional areas outside the major metropolitan cities of Australia. SMEs are a key part of regional economies and are recognised as the major source of regional prosperity and employment (Commonwealth of Australia, 2003, Chen et al., 2006).

A number of web and internet-based technologies may facilitate knowledge-sharing among businesses in a regional area. These have attracted the interest of government and commercial organisations working to promote economic development. However, the anticipated benefits of investments in information and communication technology (ICT) to facilitate regional development have proved elusive (see Thompson, 2005, Hearn et al., 2004, MacGregor and Vrazalic, 2005). The enthusiasm shown by governments for technological solutions for business and community development has not been matched by the engagement of regional SMEs in online networking forums (see for example Pigni et al., 2005).

A successful system needs to facilitate networking and knowledge-sharing in a way that is acceptable to the small businesses. These firms need a networking system that is consistent with their information needs and social circumstances. Recent research by Chen et al (2006) revealed that SMEs in the UK recognise the importance of external knowledge and are using both conventional and electronic networks channels for knowledge-sharing. However, this knowledge-sharing is predominantly occurring through face-to-face with only a third of the SMEs using ICT for networking (Chen et al., 2006). We need a better understanding of the reasons behind the inertia impeding the use of ICT. In particular, we need to know the range of possible channels for ICT knowledge-sharing and the factors that influence the decision to use such channels.

Kaufmann et al. (2003) recommend that governments and regional planners should determine which knowledge-based techniques are appropriate for sustainable regions and only then implement ICT (including online channels or platforms for web-enabled networking) to facilitate those initiatives. Such a change of focus will require pro-active knowledge management (KM) strategies. These will need to stimulate SMEs’ knowledge-sharing and then encourage them to incorporate web-based communication into their knowledge-sharing. This suggests that the right mix of channels must be provided to match the social and economic activities in which small business networks engage. A powerful tool may return no real benefit if the providers do not understand how it fits within the range of interactions among those businesses. If the potential of these channels is not understood in context, there is a real danger that an appropriate mix will not be provided. As a result, expensive systems
may remain unused or underused and SMEs may be alienated from the networks that can assist them and their regions. Before such initiatives can be undertaken a clearer understanding of the socio-technical factors that form the basis of knowledge-sharing in this milieu need to be identified.

In this paper we provide an analysis of socio-technical factors that influence knowledge-sharing by regional SMEs, particularly when using web channels. A hallmark of this regional context is that SMEs are in a diverse range of industries and thus have no central industry focus. The lack of an organisational authority to mandate the use of specific web-enabled communication means that SMEs’ participation in any networking activity is purely voluntary. Little work has been done to identify how various knowledge-sharing channels could be combined to provide a robust system appropriate for this particular context.

Our purpose is to identify a combination of channels, including ICT and web-based applications, suitable for a regional knowledge-sharing system among SMEs. This analysis fills a gap in the knowledge management literature because previous investigations into regional SME contexts have overlooked their cross-industry nature and unique knowledge-sharing requirements. The literature exploring the regional SME context has concentrated on technological issues rather than focussing on the socio-technical aspects of knowledge-sharing. This literature has also overlooked the different contributions that various web-based channels could make to knowledge-sharing. The socio-technical insights into knowledge-sharing channel use provided in this paper can enable a better understanding of the needs of regional SMEs.

We present an analysis of the way that SME owners see various business networking channels. This includes an evaluation of each channel’s strengths, weaknesses and appropriate use. We present results from a larger project which investigated the value creation potential of Virtual Communities of Practice based on cross-industry SMEs in regional areas outside the major metropolitan cities of Australia. The paper provides insights into the perspectives that SMEs have on knowledge-sharing using various communication channels. These include web-based technologies commonly found in large organisational virtual knowledge-sharing communities (known as virtual communities of practice) viz email, online forums, expertise databases, and websites.

2 Literature Review

2.1 Regional SMEs and their Knowledge-sharing

The importance of knowledge-sharing for stimulating innovation has been part of the regional context since Marshall (1947) first identified the agglomerative effect of co-locating firms in geographically-based industries. More recently, MacKinnon et al (2002) outlined the innovative milieu required for the new global knowledge economy where collective learning, cooperation and the transfer of knowledge result in innovative synergy rather than simply in interaction (see also Capello, 1999). In this context, SMEs are key players because of their small size, flexibility and willingness to take risks. Perhaps this is why researchers are increasingly focussing on the role knowledge-sharing plays among networks of SMEs in stimulating regional innovation and economic development (see for example Corpakis, 2005, Novelli et al., 2006).

The concept of social capital enables us to identify potential socio-technical factors (especially social factors) which might influence knowledge-sharing within such innovative
milieu of regional SMEs (Nahapiet and Ghoshal, 1998). Huysman and Wolf define social capital as a ‘…network ties of goodwill, mutual support, shared language, shared norms, social trust, and a sense of mutual obligation that people can derive value from’ (Huysman and Wulf, 2004, p 1). Social capital has three dimensions: structural, relational and cognitive (Nahapiet and Ghoshal, 2002).

The structural dimension of social capital suggests that a social network can be configured in a variety of ways. The network ties or links between network members can be horizontal, diagonal or hierarchical. Much of the research into innovative milieu involving networks of SMEs in a regional context has tended to focus on intra-industry clusters (see for instance St John and Pouder, 2006, Rocha and Sternberg, 2005). These are characterised by collective networking embedded in strong local linkages that bond firms together (Lawson and Lorenz, 1999).

Evidence is emerging, however, to suggest that it is equally important to look at cross-industry SME business networks, characterised as innovative milieu. Smedlund and Poyhonen (2005), examining knowledge-sharing among regionally clustered small businesses in the Finnish mechanical wood processing industry, found that an innovative milieu developed when knowledge was shared on weak bridging links either diagonally across production chains or to external entities rather than within the industry itself. This enabled new solutions and problem solving and indicates the potential of a cross-industry network of regional SMEs to become an innovative milieu. In the above example the structural dimension of social capital indicates the importance that link strength has for knowledge sharing by cross-industry regional SMEs.

The relational dimension refers to the way members are incorporated into a network through its norms, and obligations based on trust. Trust is a key factor in any knowledge-sharing because it enables cooperation among members and the embeddedness of local SMEs provides access to regional expertise and information, (MacKinnon et al., 2004). The relational dimension of social capital suggests that trustworthiness will be an important factor influencing SMEs’ use of web-based knowledge channels in the context of regional cross-industry business networks.

The cognitive dimension of social capital consists of shared codes, language and stories of the members. A shared understanding of the regional context must be established before any innovation can occur. This enables diverse forms of knowledge within the region to be integrated so that new innovative knowledge can emerge. Thus a cyclic interaction occurs between the explicit or codified knowledge and the personal or tacit knowledge (Polanyi, 1962) from which innovative ideas emerge (Lawson and Lorenz, 1999).

The real value of sharing tacit knowledge is in its contribution to innovation (Leonard and Sensiper, 2002). It is remarkably hard to extract because it is held by the individual or within the context (Pan and Scarborough, 1998). Thus to be able to access it requires shared beliefs, values, experiences and trust. An individual is unlikely to share tacit knowledge unless they trust the person or situation in which the sharing occurs and have confidence that it will not be used to affect them adversely (Nahapiet and Ghoshal, 1998). Consequently, the tacitness of knowledge-sharing requires a high level of trust and is therefore inherently local. Sharing tacit knowledge usually occurs in long-term relationships, in contrast to explicit knowledge which is shared in external short-term relationships. The interaction between these two forms of trust-based knowledge-sharing stimulates innovation (Ganzaroli and Pilotti, 2004).

These dimensions of social capital suggest that the choice of web-based knowledge-sharing channels involves three factors: strength of links, the level of trust and the degree of tacit
knowledge shared. The issue becomes, what form of socio-technical network would provide the most appropriate access to knowledge-sharing channels for cross-industry regionally based SMEs?

2.2 Socio-Technical VCoPs and Channel Use

The knowledge management perspective with the greatest potential for supporting SME knowledge-sharing in regional business networks is the formation of communities of practice (CoPs) (refer Mason et al., 2006a, Braun, 2002, Benner, 2003, Forsman and Solitander, 2004, Ho et al., 2003). CoPs are ‘… groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Wenger et al., 2002, p 4). By socialising knowledge-sharing within a region, the knowledge is not only made available to the region, but also engenders a powerful source of competitive advantage (Stewart, 1997).

CoPs become virtual communities of practice (or VCoPs) when ICT is the major channel by which members communicate. The move to the virtual domain increases the opportunity for innovation through the sharing of knowledge across boundaries and exploiting the power of weak ‘bridging’ links. This fluidity of boundaries and the inclusivity of VCoPs makes them an ideal socio-technical approach (Coakes and Smith, 2007), because it takes into consideration the interrelationship between social capital and ICT. However, going virtual alters the communication process and the way social capital is developed, which necessitates pro-active management of the VCoP. This is difficult in the regional SME context where there is no organisational mandate or infrastructure readily available (Mason et al., 2006b). A socio-technical approach to ICT-enabled business network formation and sustainability is essential to avoid the narrow focus on technology which has characterised many (failed) initiatives to develop virtual networks (Hearn et al., 2004).

In addition to the three social factors described above, we identified two technical factors that influence channel use. These are: usability and currency. Usability refers to the strength of the users’ perception of the usefulness, ease of use, and their acceptance of the channel as identified by Davis (1999) in his Technology Acceptance Model (TAM). The currency of the channel identifies how up-to-date and reliable the knowledge shared is perceived to be (Kankanhalli et al., 2003). When strong the user perceives it as up-to-date and very reliable, but weak if the content is unreliable and not current.

A number of channels used in VCoPs by large organisations provide potential for knowledge-sharing by SMEs in regional cross-industry business networks. These include face-to-face interaction, telephone conversations, email and online forums. These are possibly the most frequently used channel by VCoPs. Expertise databases are used in VCoPs to help users identify and contact people with the knowledge or expertise they require (Kankanhalli et al., 2003).

The existing literature on VCoPs in large organisations provides little insight into which factors influence the use of the various channels and does not provide guidance about how this analysis should be undertaken. The focus has tended to be on the social and economic aspects of knowledge-sharing in VCoPs. An exception was Ardichvili et al.’s (2003) cross-cultural research that compared the socio-technical implications of email, face-to-face and telephone channels used in VCoPs within the global operations of a large multinational company. Their findings suggested that the social capital dimensions of link strength, trustworthiness and the tacitness of knowledge-sharing could also apply to regional business networks.
In our analysis we have sought to extend these ideas by addressing the following questions:

- What factors shape SME owners’ choice of networking channels?
- How do they use each of the main channels in their business networking?
- What does this indicate about the appropriate configuration of a virtual community of practice among SMEs in regional areas?

3 Method

The findings reported in this paper emerged from a larger project seeking to establish the value creation potential of VCoPs for cross-industry regionally clustered SMEs. An interpretive multiple case study was conducted in two regions outside the major metropolitan cities in Australia. The cases (regions) were selected because both were economically successful and were engaged in active business networking. A cross-industry business network which provided value and support to its SMEs was identified in each region. The network in the larger region had 900 members; the network in the smaller region had a membership of 300. Both of the networks ran well attended regular networking events. The older, larger region was very proactive in facilitating small business involvement in the region, acting as a think tank and lobby group, and encouraging long-term thinking throughout the region. The younger and smaller network’s main focus was to promote networking as an opportunity to create cross industry opportunities.

The two cases were selected because they enabled insights into the significance of SMEs, the role of governments and their interventions, and the potential of ICT for enhancing knowledge-sharing and value creation within regional non-industry aligned business networks. Accessing a range of perspectives is a major strength of multiple case study research (Yin, 2003). The interpretive approach enabled a deeper understanding of the issues (Kaplan and Maxwell, 1994) relating to knowledge-sharing. These involved identifying common factors, searching for patterns, exploring these with participants, and establishing their applicability to web technologies. This research method elicited rich descriptive data from the interviews and enabled us to identify common themes including those outlined in this paper.

The data used in this paper were derived from semi-structured interviews with 23 small business owners involved in the two regional networks described above. These participants were a targeted selection from the 192 telephone interviews conducted earlier in the project. The SMEs selected were actively involved in their respective networks and were achieving significant benefits from them. Their active networking involvement meant that they were not representative of all such businesses, however they provided an excellent source of information about channel choice and use for effective knowledge-sharing.

Face-to-face interviews of approximately one hour were conducted with individual SME from the two regions. The interviews covered factual information about the firm’s strategic position and the region before canvassing the interviewees’ opinions on such issues as the role of the network, knowledge-sharing, problem solving, value creation, and the modes of communication used in those interactions. Interviewees were also asked about their views of the value creation potential and viability of web technologies commonly used in VCoPs, namely email, online forums, and expertise databases. Before completing the interview, participants were given the opportunity to add comments and ask questions, and much useful additional information was volunteered at this stage. The interviews were taped and
transcribed and any additional comments or relevant notes made during the interview (plus post-interview comments) were included in these transcripts.

3.1 Analysis method

An inductive analysis of the interviews was employed to clarify key socio-technical factors influencing channel selection and use in networking. This confirmed the social and technology factors identified from the literature. A third technological factor *durability* emerged from the interview data. *Durability* involves the permanence of the content that is shared on the channel. If durability is strong then the message has permanency, but when weak the message content is transient.

This produced six socio-technical factors relevant to channel use for knowledge-sharing as listed below:

1. **Link strength** is the degree to which social links are involved in the process of knowledge-sharing. When strong bonding occurs through knowledge-sharing on the channel the link strength is high. Low link strength indicates that knowledge-sharing via the channel is occurring across weak bridging links.

2. **Trustworthiness** is the degree of trust participants have in the knowledge-sharing channel. It reflects their confidence about the quality of the information they receive. It also includes their confidence about how the information which they provide will be used and protected from unwanted interference.

3. **Tacitness** (of knowledge) refers to the sharing of less structured and more personal knowledge. Tacitness is high when the knowledge shared on the channel is highly tacit and low when the knowledge shared is primarily explicit.

4. **Usability** refers to the user’s perception of the usefulness and ease of use of the channel. High usability indicates users’ acceptance of a channel.

5. **Durability** is the permanence of the content of the knowledge shared on the channel. Some media are perceived as more long lasting and are used or not based on this perception. Durability is high when the message is perceived as permanent. It is low when the user’s perception is that the message content is transient.

6. **Currency** is the degree to which the information is current and up-to-date, and thus reliable. Currency is high when the knowledge shared is perceived as up-to-date and the can be relied upon. It is low when it is out-of-date or is unreliable.

We identified a set of channels for networking communication relevant to the context of the two regions. The VCoP literature identified email, online forums, and expertise databases as common channels (see for example Kankanhalli et al., 2003) to which we added face-to-face communication as it was a key part of the regions’ networking experience (see for example Hildreth and Kimble, 2000) and websites because they were identified by interviewees as a knowledge-sharing channel.

Cross-tabulating the six socio-technical factors with the five knowledge-sharing channels produced an analysis matrix which is presented in Figure 1.

The interview transcripts were analysed and coded to produce an assessment for each cell in the matrix. This produced an assessment of each channel for each the six socio-technical factors as high, moderate or low. The results of this analysis are shown in the cells of Figure 1.
4 Findings

The analysis summarised in the matrix in Figure 1 gives a coherent overview of the strengths and weaknesses inherent in knowledge-sharing for each of the identified channels. Each channel shows a unique profile based on the importance for each of the identified socio-technical factors.

4.1 Face-to-Face

Face-to-face meetings were the major form of interaction, with both networks holding regular networking events. In the larger region these were held monthly on a different day each month to ensure all members had an opportunity to attend, although getting to meetings was a common problem. At these events members were allowed an hour prior to and following the formal 30 minute business session to network with other members. This was always timed for the end of the working day, a fact which was greatly appreciated by members, because it enabled them to continue their networking informally after the event, frequently over a meal. The smaller network’s events were quarterly sit-down breakfast or dinner occasions, where one hour was given prior to the meal for networking. This latter aspect had been demanded by the members because they were not getting enough opportunity to network sitting at tables. This indicated the importance members placed on networking for their ongoing membership involvement.

Face-to-face interaction was clearly the preferred and most trusted environment, enabling the building of relationships, solving of problems, and validating contacts through interpersonal knowledge-sharing. A sense of camaraderie and strong bonding emerged as evidenced by the following comment from a participant who owned one of the larger businesses:

‘All these smaller SMEs, see this [network] as effectively a means of connecting with other like-minded organisations in their community, so that they can learn, share experiences, develop business, and probably, also come up with a level of strategies which can help the businesses in our region grow! And then lots of SMEs, smaller SMEs see this as an opportunity of growing, to gain knowledge, to share knowledge, share experiences, and generally enjoy networking’.

Face-to-face was a highly useable channel and the time involved was recognised as being worthwhile. Members kept up-to-date and this provided them with valuable opportunities for business development. Face-to-face was not a durable form of communication, since neither network formally minuted the proceedings.

We can summarise the socio-technical characteristics of the face-to-face channel:

- Link strength was very pronounced, visible in social links which formed the basis for knowledge-sharing at the networking events.
• Trustworthiness was very high as was indicated by their willingness to share with their knowledge other members.

• Tacitness was high and the knowledge-sharing at events was purely an interpersonal exchange.

• Usability was high for those who managed to attend the sessions. For others, difficulties in getting to sessions and the timing of events reduced the level of usability.

• Durability was low as no explicit record of interactions was made.

• Currency was high as the knowledge-sharing occurred in real time in interpersonal interactions.

4.2 Email

Email is universally used by businesses in Australia and these participants were no exception. Email formed a major part of their daily business interactions. Participants found that it was quick and easy to use and thus was the most convenient of the web-based channels. Its key strength was its ability to formalise and document explicit business knowledge-sharing, and many used it as their major form of electronic transactions with clients, suppliers, and for banking. Participants believed that it was an essential business tool and without it they would not be able to operate in the current business environment. In fact, it has dramatically changed the way that they do business, as was made clear by one participant:

‘We have got a post office box. Our amount of mail over the last I reckon, three years, has almost got to a stage where what the hell are we doing with the letterbox! Compared to what it used to be. You know, and if you go back 10, 15, 20 years or more, post office box every Monday morning used to be chock-a-block [totally full]! Not anymore! And if you do, it is half, full of junk mail!’

Almost all participants made it clear that email was not a trusted environment, neither was it a suitable mechanism for tacit knowledge-sharing. The high level of email use contrasts with the lack of trust as a result of their high durability. Participants expressed concern that once an email was sent they had no control over whom it was sent on to. Several mentioned situations where they had been adversely affected by emails they had sent, believing that they were confidential, and then finding that they had been forwarded to others. On the other hand, emails were the preferred mode of sharing of explicit and non-confidential information in business communication. These small businesses viewed email as the preferred means of documentation in the current business environment. The durability issue was expressed clearly by a participant as follows:

‘I think e-mail has a lot of tremendous advantages, but in terms of the confidentiality tool, or a tool to sort out challenging business issues, it wouldn't be one that I would get involved in. If I wanted to use it as a fair and true and accurate record of stuff that has happened I would be happy to send it out. But, I would not, would not go too far into the confidentialities on e-mails at all’.

There is a generational issue in that the older members firmly believed that younger people found email easier to use than they did. In fact a few small business owners relied on younger members of staff to do all their emailing, as one participant commented:
'Oh, to the young ones it [email] is everything, it is just done via Internet and computer and what have you. And even purchasing, you know we’ve got e-mails everyday, and usually they are from people 40 and under.’

The email channel showed the following socio-technical profile:

- **Link strength** was very low because email was seen narrowly as business communication rather than as social communication.
- **Trustworthiness** was low. There was virtually no confidence that the sender was able to control, or even know, who was going to receive their emails or that it would be protected from unwanted interference.
- **Tacitness** was low as the knowledge-sharing was highly explicit, structured and impersonal.
- **Usability** was very high as it was easy and convenient to use, although more so by the younger members.
- **Durability** was high because once an email was ‘out there’ there was no way of removing it.
- **Currency** was high as the messages exchange was rapid and messages carried dates.

4.3 Online Forums

Online forums were defined as the ability to conduct online discussions on a password protected site where members could seek answers to problems and discuss issues. Neither network had a forum on their website but participants were aware of how such forums operated. Only a few of the participants were currently using online forums and these were professional or trade-based forums involving interactions with peers both nationally and internationally. This confirmed the distributive effect of ICT-enabled interactions found by Bellini et al. (2003). Many thought that an online forum within their network would benefit members. As one participant who had used forums stated:

‘I think it would be brilliant! The spread of people that you have got in there, certainly issues that you could not have sought out yourself. It would be a great way of doing it’.

Trustworthiness and security concerns included exposing one’s weaknesses by asking for help, and in providing information that could be used to harm the business. As one participant, in a highly competitive industry, who was unfamiliar with forums stated:

‘You have to be careful. ‘Cause you can advise someone, and they do it and it goes wrong, and they come back and say, “You advised me, I have gone broke, I am going to go [get back at] you”’.

Participants were specifically asked about the types of information they were willing to share via online forums. Almost all stated they would be willing to share information on member-based forums about best practices, market and marketing information, how they managed alliances and, surprisingly, their ideas for innovation. This was eloquently expressed by a forum user:

‘I think that the more you share, the more the region is going to grow and expand. And I think there is no such thing as an original idea, so because I have happened to have thought of it today. It doesn’t mean that somebody hasn’t thought of it yesterday.’
The apparent discord with the lack of trust was explored further with participants who indicated that they construed such sharing to involve more generalised explicit information. If more specific knowledge was required they would insist on a face-to-face meeting as one participant commented:

‘If they say, “I want to discuss this with you”, I say, “Look, I am happy for you to come up and see me” Do it that way. And the body language, you can tell whether there is art[fullness].’

The level of durability was not seen as significant because information was out of date too quickly, and participants did not see the benefit of forum archives. The informality of online forums was a perceived strength, but it was also a weakness as it was virtually impossible to gauge the reliability of sources of information.

Almost all participants viewed the major strength of knowledge-sharing in online forums as the ability to find up-to-date solutions to problems quickly and easily. Thus their usability was a key strength. A problem was the difficulty in establishing the worth of the information being shared as one non-forum user commented:

‘Those forums are just full of people with nothing better to do than fill in the day, talkin’ crap’.

This comment highlights a major limitation for involvement by small businesses: lack of time. Perhaps an associated web technology with the greatest potential for facilitating forum involvement by time-poor SMEs is ‘jams’ (Dorsett et al., 2002), where a specific time period is set for online discussion with an expert or on a relevant topic.

We summarise how the factors did or might influence the use of the online forum channel:

- **Link strength** was moderate because initial contact was via weak bridging links which had the potential to develop into stronger links over time.
- **Trustworthiness** was low because there was no easy way to validate the worth of the information provided and because there was little confidence about how information provided would be used.
- **Tacitness** was moderate as the knowledge-sharing was initially impersonal. However much useful tacit information could be obtained from links subsequently established via other channels.
- **Usability** was judged to be very high because participants familiar with forums felt comfortable in using this format.
- **Durability** was low unless there was an archive of information. Interestingly, participants did not view an archive as worthwhile.
- **Currency** was moderate. Although the knowledge-sharing occurred in real time online (and hence was up-to-date), there was no way of validating this.

### 4.4 Expertise Databases

Only a limited number of participants were familiar with expertise databases, so the responses do not reflect actual experience. An expertise database was described to participants as an online database of contact details and key information about each member and their specialised expertise (for example, an ore crushing specialist who is the foreman in multinational mining company). Interestingly, participants were very excited about this concept and readily recognised the benefit such bridging links could provide. This was
illustrated in the comment below by a participant who was conversant with expertise databases:

‘I think it would be fantastic, because we have so many businesses on the small side of that SME who really are not quite sure where to take the next step. And they are not in a position where they can afford to go to someone who is going to cost them a lot of money. So if there were people out there who were prepared to be on that list and were prepared to answer questions honestly, I think that is invaluable to so many small businesses.’

Knowing that the database would be only for members of their network increased participants’ confidence in its trustworthiness. They believed it would have high usability as long as the search engine used for locating experts worked efficiently. Conversely, this usability created an issue. Concerns were raised about the expert being contacted so frequently that they would be overwhelmed. Several suggested having a time allocated where a topic or an expert would be available, mirroring the idea of ‘jams’ mentioned earlier. Although described as a one way mechanism for contacting experts, participants readily recognised that the resulting interactions would provide access to more tacit knowledge when telephone or face-to-face contact ensued. In one region the durability of expertise databases was frequently cited as an advantage. In the other region, however, concern was expressed about the currency and thus the accuracy of information because the network’s website was renowned for not being kept up-to-date.

The potential for innovation deriving from expertise databases is strong. They combine the strong ties of the network (which encourages trust in the value of the knowledge of the expert) with the weak ties between members unknown to each other. Participants from both regions frequently referred to the significant contribution that expertise databases make in assisting the retention of business activity in the region. Expertise databases must be kept current for their benefit to be realised, or the members will lose confidence in them and stop using them.

The expert database showed the following socio-technical characteristics.

- **Link strength** of expertise databases was low as it did not entail rich, personal information sharing.
- **Trustworthiness** was high because the entry of experts’ details would be managed by the network and limited to members who were already trusted.
- **Tacitness** was moderate. Although the initial knowledge-sharing was impersonal, it had the potential of providing access to useful tacit information via other channels.
- **Usability** was viewed as moderate and depended on the availability of experts to answer questions or engage in discussion.
- **Durability** was high as the information would continue to be available in an easily accessed form.
- **Currency** was moderate, since the value depended on the database information being kept up-to-date.

### 4.5 Network Websites

It may seem unusual to include websites in a discussion about knowledge-sharing, however, in both the telephone and semi-structured interviews websites emerged as a major channel of explicit knowledge-sharing. Participants maintained links to frequently used sites and many had established contacts that had developed into long-lasting relationships where tacit
knowledge-sharing frequently occurred. The trustworthiness and security of websites was generally accepted by participants.

The networks in both regions had websites where members’ details were listed. In the larger region the network had recently revamped its website. Member details were promptly entered or updated by the paid staff who managed the network and a weekly bulletin on events etc in the region was also provided. This website was actively used by participants, as one commented:

‘When I was in Melbourne I had not been to the last two meetings [events]. And I got onto the computer and had a look to see what they were doing, and if I had missed out. Just [to] have a look and see what’s happening if there is anything new while I have been away’.

In the smaller region the website was managed by a volunteer member. Participants complained about the considerable delay in entry and changes of their details. Although there was a newsletter on the website it had not been updated since 2004. This network’s website was almost unviable as epitomised by this comment:

‘Just getting some basic content changed, on their website related to my business. It took probably three months, and about 30, 20 emails’.

Neither of these websites had areas for ‘members only’.

Participants found the usability of websites provided enormous efficiency advantages, in terms of the amount of readily available information and the ability to conduct e-commerce on the web. However this was undertaken by the minority because most perceived websites as a marketing tool, reflecting the findings of Beckinsale et al’s (2006) UK research. Usability was also cited by the participants as websites’ greatest disadvantage because the required information was frequently hard to locate and considerable time was wasted searching multiple web pages.

A key issue for websites was the need for the information on them to be both relevant and current. If such channels cannot meet these requirements, then their trustworthiness would seriously decline.

The socio-technical characteristics of the website channel are as follows.

- **Link strength** of websites was low because they were largely used for accessing information via bridging links, and social links were rarely involved.
- **Trustworthiness** was high because it was the major source of specific business information.
- **Tacitness** was low because the information was purely explicit business knowledge.
- **Usability** was moderate. Whilst many websites were easy and convenient to use, many were difficult to navigate and there was a perception that the needs of small businesses were not being met.
- **Durability** was high, but once information was placed on the channel it was difficult to get it changed or removed.
- **Currency** was moderate, because while information should be up-to-date, frequently this was not the case. This resulted in the loss of productivity and inconvenience to small business users.
4.6 Discussion

The inductive approach described in this paper has identified and examined six socio-technical factors relevant to channel use for knowledge-sharing by SMEs in regional cross-industry business networks. The channels examined cover a range of knowledge-sharing tools, a list which is not exhaustive and could be extended to include other channels in future research. Each of the identified factors is distinct, though there are clearly interplays among them. A unique profile of knowledge-sharing was found for each channel when analysed using the six socio-technical factors. This indicates that the matrix in Figure 1 provides a useful analytic framework.

We can see from this analysis that these channels are not interchangeable but, together, can provide a powerful set of knowledge-sharing tools. A successful knowledge-sharing system would include both face-to-face and online channels. This is likely to be particularly relevant for regional areas where local links are important. Additionally, a knowledge-sharing system needs to include channels that stimulate innovation by facilitating tacit knowledge transfer. This further reinforces the importance of facilitating connections between individuals via fact-to-face interactions supported by online channels. The use of email, while important for business communication, was clearly not a significant contributor to tacit knowledge-sharing and the development of VCoPs in these regions. It is probable that email has been over-rated as an online collaboration tool for regional SMEs, and perhaps more broadly.

Our purpose in this paper was to identify how a combination of channels, including face-to-face and ICT applications, might be used to support a regional knowledge-sharing system among SMEs. Examining the socio-technical factors influencing channel choice among regional SME highlights the strengths and weaknesses of each of the identified channels. We showed that all these channels are useful for knowledge-sharing by SMEs in regional business networks, and that they can make a contribution if their benefits and limitations are understood. The participants in our study indicated a strong preference for face-to-face interactions when sharing tacit knowledge. They were positive about using expertise databases and, to a lesser extent, online forums. A surprising finding was their unwillingness to use email because of dangers identified in sharing tacit knowledge or information that might be sensitive. This is in direct contrast to the large organisational context where email is the major source of communication in VCoPs. Email was their primary technique of business communication which replaced paper-based interactions. It was apparent that a well managed website that is easy to use and kept up-to-date is an essential foundational channel for such knowledge-sharing ICT initiatives in these regional areas.

5 Conclusion and future work

This paper responds to the recommendations in the literature that governments and regional planners should investigate the applicability of knowledge-based techniques for sustainable regions, and implement ICT as a means of facilitating those initiatives. However, we challenge the commonly-held view that SMEs will automatically use ICT effectively merely because the infrastructure is provided. Instead, we argue that regional development must begin with pro-active strategies that stimulate SMEs’ knowledge-sharing using traditional face-to-face channels. It is only then that SMEs might be encouraged to use web-based communication for knowledge-sharing.

There is a vital role to be played by online channels which can bridge the social space between individuals who would not otherwise connect with each other. They can make
explicit and codified knowledge available, which is a significant benefit for businesses in the region. Because the information provided on these channels is relatively durable, they offer a counterpoint to the more ephemeral qualities of face-to-face knowledge exchange. But this contribution relies heavily on the usability of a channel and the currency of the information it provides. Without high usability and currency, they offer little value to regional businesses.

Each regional knowledge-sharing system must be actively managed, both socially (to develop and sustain link strength) and technically (to ensure that the channel is robust and easy to use and that information is appropriate and current). The trust of participants in a knowledge-sharing system and a VCoP is paramount. It is generated and sustained by a combination of social ties, identification with the region and confidence in the technical system.

References


Thompson, H. (2005) 'Using cluster theory as the lens through which the results of government funded online service initiatives can be examined', CRIC Conference 2005, Ballarat, Australia: University of Ballarat.
