Institutional Collaboration, Learning and Context: A Case Study of Tasmanian Information Technology Institutions

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Declaration of Originality

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ABSTRACT

With increasing devolution of governance, collaboration has become ever more important as a means for community groups, regions and institutions to meet their needs. Firms also use a variety of collaborative arrangements to meet their need to compete effectively in local and global markets. However, for all the growth in collaborative activity, there are many fraught or failed attempts suggesting a need to better understand the processes of collaboration. This thesis contributes to our understanding of institutional collaboration, focusing on institutional collaborative activity, learning and context. Collaboration is not considered as a stand-alone activity, but as an activity that is a learning process influenced by context.

Context, institutional collaboration and learning are generally treated as separate components or processes. Furthermore, context is often depicted as that which is external to phenomena, but which impacts on the phenomena. Activity theorists, however, generally recognise context as being intrinsic to activity, noting the mediation of context within the contradictions of the activity. However, Cultural Historical Activity Theory tends not to explore the mediating influence of context as social relations of the mode of production and historical trajectories beyond acknowledging these influences. Rarely is the mediation of economic, social, political and ideological influences arising from the social relations of production explored in depth. In this thesis, these mediating influences are termed contextual conditions and include the mode of production, dominant discourses, policy, industry development, regional infrastructure and institutional arrangements analysed. The mediating influence of contextual conditions on institutional collaborative activity contributes significantly to our understanding of institutional collaborative activity.

A case study methodology of information technology institutions and their collaborative activity between 2002 and 2004 in a small regional state of Australia is used in this thesis. Cultural Historical Activity Theory is used to develop data collection tools and to analyse the data. Engeström’s (2004) advice to follow the object when studying interaction between institutions is employed as a key data
collection and analytical tool. A focus on a developing Marine Information, Communications and Technology Cluster and the involvement of three key Tasmanian information technology institutions is used to analyse how contextual conditions mediate collaborative activity and learning.

Within the limitations of a case study, this thesis contains important lessons for policy makers. Analysing the influence of contextual conditions on collaborative activity becomes a tool for policy makers in identifying where their efforts and resources might best be placed. In a small regional State for instance, it was evident that there were limited institutional arrangements in place at the time data was collected. It was evident there was a role for state government policy makers to assist development of the industry and its collaborative capability. This would include encouraging the development of relations and exchange between institutions such as the employer, research and government institutions. Such a role would potentially increase the capacity of a small industry. However, without a tool such as analysis of analysing the influence of context on collaborative activity, this role was not apparent to those involved.
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All those respondents I interviewed and/or spoke with to make appropriate contacts, or set up observations or participate in industry activities gave generously and freely of their time. Without them there would be no thesis! Thank you.

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1.0 INTRODUCTION

The aim of this study is to investigate the complex interaction of institutional collaboration, learning and the ways in which context mediates possibilities and constraints in the Tasmanian information technology industry. The study is designed as a case study of the small but emerging information technology industry. The site of the case study is the regional state of Australia – Tasmania –
defined as regional by the Australian Bureau of Statistics because of its small, dispersed population.

What is known of each of these concepts of institutional collaboration, learning and context is explored in the review of the literature in Chapter Two. Chapter Three sets out the methodology employed in this study. The fourth chapter provides background information about the State of Tasmania, as well as the national and state information technology industries. Each of the subsequent chapters addresses a research question, and these are followed by the conclusions in the final chapter. The research questions for this study are:

1. What is the experience of collaboration between institutions in the Tasmanian information technology industry?
2. What contextual conditions influence institutional collaboration?
3. In what ways do contextual conditions influence institutional collaboration?
4. How can institutional collaboration be conceptualised as learning?
5. In what ways do contextual conditions mediate learning in institutional collaboration?

What can a study of collaborative activity add to the existing literature on collaboration? Much of the literature on collaboration identifies typical themes such as trust, leadership, communication, coordination, information flow as discussed in Chapter two. This thesis acknowledges these elements as important, but considers the process of identifying elements of collaboration to be one dimensional, not accounting for the mediating influence of the tools of collaborative activity, and the context of collaborative activity. As indicated in the title of this thesis, this study takes quite a different perspective to existing studies of collaboration. By understanding collaboration as collaborative activity, this study acknowledges and works with the complexity of interactions, appreciating learning as implicit in such activity, exploring how and why learning occurs.

In this thesis, the complexity of interactions is explored through a conceptual framework drawn from Marxian concepts of the social relations of production,
providing for the first time a framework in understanding ways in which contextual conditions mediate activity, actions, and thus also our learning. From the data and literature explored in Chapter six, seven contextual conditions are identified: the mode of production, history, dominant discourses, the process of industry development, government policy, the degree of infrastructure and resources within a region and/or industry, and institutional arrangements. Just as language, stories and historical processes are important aspects of organisational culture, so too is history and the language and stories employed in promulgating dominant discourses. The cultural aspects of language, stories and historical precedent are important in cultural aspects of context. These cultural aspects interact with and mediate modes of production and vice versa, and are evident in government policy. Each contextual condition mediates and is mediated by other contextual conditions. As collaborative activity is important in industry development, the development of institutional infrastructure and institutional arrangements, and the learning required to develop these conditions, an understanding of how these contextual conditions mediate collaborative activity is a significant contribution to new knowledge in this field.

This theoretical framework was developed through an analysis of data in conjunction with a range of literature. Vital to this conceptualisation was the activity theoretical approach undertaken in the collection and analysis of data. An activity theoretical approach provides a means for analysing the complexity of interactions in collaborative activity. Current activity theoretical approaches however, are limited in their acuity in relation to the mediation of context in collaborative activity. This thesis develops a framework for understanding and analysing the mediation of contextual conditions in collaborative activity.

As the narrative in Appendix one tells, my work in the women’s movement, the peace movement and the trade union movement identified the importance to me of collaborative activity, the role of context and as a professional educator, the
learning that occurs through these activities. For these movements collaborative activity is essential, just as it is essential in industry and regional development. Such activity is critically important for Australia and Australians now and into the future. As indicated in Appendix one, my participation in these movements, highlighted for me, the influence of context.

1.1 BACKGROUND

There is an increasing need for collaborative work. Collaborative work requires multiple, complex, ever-changing relations across an array of organisational forms and patterns of multi-organisational relations (White, 2001). The increasing need for firms to work as part of a supply chain and/or as part of activity in a regional milieu (Camagni, 1991; Gulati, 1999; Keeble, Lawson, Lawton Smith, Moore and Wilkinson, 1998), for service organisations to interrelate with a range of other bodies and the rise of clusters with ‘traded links’ (buying and selling from each other) and ‘non-traded links with researchers, professional associations, financiers or government agencies’ (Munro, 2003, p. 11) is indicative of the increase in collaborative activity.

Although there is extensive research on collaboration across a variety of organisations, including firms (Abraham and Taylor, 1996; Gulati, 1999), partnerships (Mitchell, 1999; State Training Board of Victoria, 1999) and a plethora of managerialist literature on collaboration, these bodies of literature generally offer positive stories of working together. There are suggestions, for example, to develop shared mental tools (Camagni, 1991; Osar, Gualtieri, Cannon-Bowers and Salas, 1999), of ‘bottom-up planning and distributed leadership (CRLRA, 1999), the ability to manage work, good specialist expertise, working with others and self-awareness and willingness to learn (Owen and Bound, 2001). What is not understood are the complexities of collaboration: how, for example, collaboration is first established, why some collaborative activity is successful and
other collaborative activity is not. To understand these complexities it is necessary to understand the context of institutional collaborative activity.

Institutions ‘structure social and political behaviour, defining the rules of the political game and as such define who can play and how they play’ (Voss, 2004, p. 7562). Institutional collaboration is important because as Castells (1996, p. 152) points out institutions are ‘invested with the necessary authority to perform specific tasks on behalf of society as a whole’. He notes that the restructuring of capitalism has resulted in profound changes, and that institutions have a place in managing relations in a world where there is increased global competition (1996, p. 1). Institutions, be they educational, health care, economic, industry or other institutions are important in the shaping and management of these changes in everyday activity. Institutions have a major role in creating environments for successful change – politically, socially and economically. They are strategically placed to inform and implement policy, shape consultation processes, findings and information sharing. Hence for this thesis, institutions are organisations representing industry partners or participants or in some way are ‘invested with authority’ to make decisions for and on behalf of an industry. Thus the term ‘institutions’ is used in this thesis to refer to the industry institutions investigated in the Tasmanian information technology industry.

In any given historical period institutions take on specific forms (Castells, 1996, p. 151). Institutions are a complex mix of historical forms and practices as well as practices that attempt to meet current social, economic, political and ideological demands. Economic rationalism with its emphasis on market forces which make ‘markets…a central fact of political and economic reality’ has been dominant since the 1970s (Emy, 1998, p. 19). Since this time ‘Australian governments have adopted the strategy of ‘leaving it to the market’ (Smyth and Cass, 1998, p. 19) where transnational firms wield increasing power (Wiseman, 1998, p. 19) and global free market competition ‘underpin(s) much of the dominant political and...
economic orthodoxy infecting policy makers at all levels of Australian governance’ (Wiseman, 1998, p. 20). Government has ‘pulled back from its role as the redistributors of income and key aspects of the economy have become internationalized’ (Blackler, Crump and McDonald, 2000, p. 277). This is the context in which the knowledge economy has seen the rise of the information technology industry, and the increasing need for collaborative work.

A form of collaborative work increasingly considered as significant by policy makers in today’s knowledge economy, is clusters. Clusters are suggested as an important means to enable small firms and regional economies to ‘attract capital’ and ‘grow’ (Hubert, 2004). Knowledge transfer through the development of clusters in regions is increasingly a basis for OECD regional and national policy development (see OECD, 1999). Regional clusters can successfully be developed with appropriate intervention strategies. Such strategies might include employing existing interaction or the generation of interaction between firms and a range of institutions where interaction did not exist (Tsipouri, 1998, p. 6). While there are many definitions of cluster, as will become evident in later chapters, what is common between definitions is that clusters require extensive linkages and high-level collaborative skills. Understandings of cluster vary from those comprised principally of small to medium enterprises (SMEs); others are conceived as networks in which there are strong exchanges of information between producers and users in a value-adding chain’ including universities, research institutions, knowledge-intensive services, brokers and consultants, and customers (Roelandt and Hertog, 1999, p. 9).

Institutions potentially have an important role to play in the development of clusters, particularly in developing interactions between institutions and industry partners. However, there is an increasing fragmentation of relations between institutions (White, 2001). With their different histories, practices and purposes, it can be expected that institutions will and do experience difference, tension and
conflict. Given the critical role of institutions in today’s capitalist knowledge economy, it is therefore critical to better understand how institutions collaborate, what their sources of tension and conflict are and what they may hold in common.

Institutions may structure social and political behaviour, and ‘define the rules’ (Smelser and Baltes, 2001) but they are not separate from relations of production and its dominant hegemonies. Institutional collaborative activity taking place in the economic relations of capitalism, is imbued with hidden hegemonic assumptions (Wodak, 1996) and historical precedent (Putnam, 1993; Maskell and Malmberg, 1999). These are all matters that are concerned with ‘context’. Yet, as Seddon reminds us:

Context…is only occasionally a strong focus of inquiry. More often than not it is a ‘throw away term’ which summarizes all that is not of special interest (Seddon, 1994, p. 5).

Not only is context often treated as not being of special interest, but collaboration is often construed as cooperative endeavour, relatively free of tensions and conflict. Yet despite the increase in collaborative activity not only between institutions, but increasingly as a form of governance (White, 2001) there are many failed attempts at collaboration. How can we better understand institutional collaboration in today’s context?

1.1.1 COLLABORATION

Collaboration includes an array of organisational forms, involving various patterns of multi-organisational relations (White, 2001). For the purposes of this thesis, a more detailed explanation is required. A dictionary definition of collaboration is cooperating, or working in conjunction with others (Oxford Dictionary, 1972, p. 340), and is generally understood as meaning to work together. Marsick, Bitterman and van der Veen (2000, p. 11) construe collaboration as individual members of a group crossing boundaries to develop and share new knowledge. Crossing boundaries is a construct which is used in much of the literature cited in Chapter
Two. It is a useful construct, as it assists in reminding the reader that collaborative activity requires moving to the edges of a known community to interact and work with others from unknown or lesser-known communities. Wenger (1998, p. 140) defines boundary crossing as taking place when activity is carried out across different practices, with different forms of engagement, different histories, different definitions of what matters and different repertoires. For the purposes of this thesis collaboration is defined as working together at the boundaries where difference is encountered. Further, collaboration and collaborative activity are one and the same; in this thesis, collaboration is understood as a form of activity. This reflects a dialectical materialist epistemology employed in this study.

Collaboration between institutions is a part of their everyday activity. It is an intrinsic part of their practice, necessary for governance. Without collaborative activity, institutions become dysfunctional; they are unable to undertake their work of making or influencing policy, of consulting and working with constituents to determine future directions and to meet needs. The limited research on collaboration between institutions has meant that this study has relied on the literature of collaboration in its widest sense in order to explore what is already known about collaboration. A useful source of literature to assist in developing an understanding of collaboration is studies of collaboration across boundaries. This literature (e.g. Luff, Hindmarsh and Heath, 2000; Blackler et al., 2000; Engeström, Engeström and Karkkainen, 1995; Wenger, 1998) suggests collaboration at the boundaries is difficult; it of necessity is about encountering difference, it requires distributed learning and that tools can be developed to assist collaborative activity at the boundaries.

1.1.1.1 Collaboration Across Boundaries

A problematic this thesis attempts to address is how is a sense of the collective developed as different histories interact across boundaries. Luff et al. (2000, p. 14)
suggest this is achieved through the use of tools in collaborative activity and in the process cognitive activities are distributed:

People appear to think in conjunction or partnership with others and with the help of culturally provided tools and implements … The thinking of these individuals might be considered to entail not just ‘solo’ cognitive activities, but distributed ones. In other words, it is not just the ‘person-solo’ who learns, but the ‘person-plus’, the whole system of interrelated factors (Salomon, 1993, xii-xiii, original italics) (Luff et al., 2000, p. 18).

In working together a whole system learns through tools impregnated with cultural artefacts. But as Blackler et al. note, working across external boundaries is difficult, more so than achieving horizontal collaboration within organisations:

Collaboration across different systems of activity raises issues concerning priorities, identities and operational methods, as well as questions about relative authority and influence. Horizontal integration across expert communities within an organization can be difficult to achieve, for example, as the shared understandings of activity and the shared infrastructure of activity that make cooperation the norm within particular communities of activity can act as a barrier to close collaboration with outsiders (Blackler et al., 2000, p. 282).

Working across different practices and histories, often referred to as boundary crossing (Engeström et al., 1995), also requires mutual learning and an ability to recognise meaning in each other. The literature on boundary crossing is key to this thesis, as it suggests that recognising meaning in each other, and understanding others’ perspectives, cultures and tools, contributes to collaborative activity across different histories and practices.

When boundaries are crossed, collective concept formation takes place (Engeström et al., 1995, p. 321). The process of collective concept formation is a creative endeavour that requires new conceptual resources. This takes place through dialogue, argumentation, shared artefacts and the attempt to combine theory and practice (Engeström et al., 1995, p. 333). Collective concept formation is only possible if participants are able to recognise an experience of meaning in each other and develop enough of a shared sense of competence to do some mutual learning (Wenger, 1998, p. 140). As participants are exposed to different forms of engagement, difference is encountered, unfamiliar territory is entered (Suchman, 1994, p. 25) and uncertainty is experienced. As Blackler (2004, p. 187) notes,
collective development depends on the ways in which people deal with tensions. This is an important observation for this thesis as it is this tension and uncertainty that is the site of potential new learning.

However, inhabiting the boundary does not mean that learning for collaborative activity will automatically follow. Barriers to boundary crossing include ‘groupthink’, resulting in limited motivation to consider alternative courses of action (Janis, 1983, p. 9 in Engeström et al., 1995). ‘Groupthink’ can result in stereotyping external groups, further limiting options. A lack of shared mental models can also be a barrier to boundary crossing. Fragmentation of viewpoints makes it impossible for practitioners from different contexts to ‘speak the same language’ and exchange ideas about a problem (Engeström et al., 1995, p. 321). To develop shared mental models requires conscious access to concepts that may be deeply embedded, preventing reflection and the development of shared language and ideas.

Tools identified in the literature that may assist in overcoming such barriers include ‘different types of shared external representation of a problem or domain’ (Engeström et al., 1995, p. 322). These external representations are described by Engeström et al., (1995) as mediating artefacts and by Star (1989) as ‘boundary objects’ and are used to make systemic tensions ‘visible’ (Engeström, 1999). Boundary objects or mediating artefacts may include a physical object, and/or a set of cognitive tools. The boundary objects become the focus of dialogue, of knowledge construction, of argumentation, of story-telling to make meaning, facilitating shared understanding.

From their study of communication in knowledge-intensive firms, Boland and Tenaski (1995) concluded that ‘perspective taking’ and ‘perspective making’ as ways of making visible the perspectives of others to facilitate shared
understanding. These authors define perspective taking as the process of examining one’s own assumptions and those of others, and of imagining the point of view of others. Perspective making is defined as the development of more coherent meaning structures (moving from general naming and understanding to more specific understandings and naming) as individual and groups work together. For the process of perspective taking to proceed, the diverse knowledge held by individuals must be made available for others to incorporate in a perspective-taking process – that is, differences are recognised, acknowledged and valued. The unique thought worlds of others need to be made visible and accessible to others. The first step, claim Boland and Tenaski (1995, p. 359), is differentiation. Only after a perspective is differentiated can it be reflected on and represented so the actors from different groups or activity systems have something to integrate. Once a representation has been made of an individual’s knowledge, it becomes a boundary tool, providing a basis for perspective taking (Boland and Tenaski, 1995). Such an approach assumes highly developed skills in differentiation and in communicating that differentiation appropriately and meaningfully.

Engeström et al. (1995) suggest that if boundary crossing is to result in collective concept formation, and this is not always achieved, then there has to be a developed or developing practice which supports this collective learning. Boundary crossing is about operating at the peripheries of practices; it is about areas of overlap and connections to possibilities for participation. It is a space for learning within an informal community of support. Shared practice and experiences, language values, processes, procedures (Tomassini, 1993, p. 42) and tools (Engeström, 1987) are features of communities of practice. Communities of practice as defined by Lave and Wenger (1991, p. 98) are a set of relations amongst a group of people which develop over time.
1.1.2 Learning

Lave (1996, p. 6) states that ‘participation in everyday life may be thought of as a process of changing understanding in practice, that is, as learning’. That is, learning takes place though everyday activity. It can be argued that as collaborative activity takes place, so learning takes place. That learning occurs is not problematic; what is problematic is what is learned (Lave, 1996, p. 8). This approach requires a conception of learning as not only the ‘construction of present versions of past experience for several persons’ (Lave, 1996, p. 8) but as the collective construction of a future trajectory – of possibilities and constraints.

Learning in this thesis is considered to be collective; not as purely psychological, cognitive and individual. This is not to deny that within collective learning, individual cognition is occurring. Collective forms of learning require social relationships that reflect embedded, shared practices. As discussed in Chapters Two, constructivist socio-cultural perspectives of learning are useful, as they are about making meaning of experience as we interact and engage in activity and therefore cognition that is shared and distributed. As Wenger (1998, p. 226) states, learning is a matter of engagement, of the ability to negotiate new meaning and is fundamentally social. Learning through activity and engagement and through the use of cultural, social products referred to by some as tools (Engeström, 1987), is a critical aspect of collective learning. This idea is developed further in Chapter Eight.

A range of forms of collective learning are explored in this thesis, from team (Guzzo, 1996; Smith, Olian, Sims, O’Bannon and Scully, 1994), organisational learning (Blackler, 1993; Marquardt and Reynolds, 1994; Senge, 1992; Nevis, DiBella and Gould, 2000) and communities of practice (Wenger, 1998) to regional learning (Camagni, 1991; Kilpatrick and Bound, 2005) and learning economies (Australian Business Foundation, 1997). This literature is drawn on to identify possible contributions to institutional collaborative learning. However, as
Engeström argues, much of the literature about collective forms of learning assumes that learning takes place within existing, established structures and cultures and that knowledge is stable. The focus is on ‘stable, identifiable knowledge and skills, leading to lasting behaviour changes in an individual or organisation’ (Engeström, 1999, p. 6). Yet, as Engeström points out, people and organisations are constantly learning something that is not stable, ‘not even defined or understood ahead of time’ (Engeström, 1999, p. 6). In this thesis learning is understood as taking place through institutional collaborative activity; it is a collective process. Literature reviewed in Chapter Two identifies that collective learning involves information flow, tacit knowledge diffusion, and the development of commonly understood rules, norms and problem-solving heuristics. These are all skills required for effective institutional collaborative activity.

In what ways then, does context mediate institutional collaborative activity and learning? The idea that context is integral to activity has only recently become evident in some bodies of literature. The ways in which researchers have looked at context is outlined briefly below.

1.1.3 Context

Context is often understood as being that which impacts on the phenomena of study where the subject is passive, thus ignoring the subject’s relations with the objective world and ignoring the activity of the subject (Leontyev, 1997, p. 1). This is evident in historical psychology of the early to mid-twentieth century which was modelled on the natural sciences with their expectation that a purely naturalistic, value-free scientific psychology could provide resolutions to the dilemmas of people’s lives (White in Cole, Engeström and Vasquez, 1997, p. xi). It was not until the late 1970s and early 1980s that psychologists began to consider context in their research. The term ‘cultural psychology’ (Cole et al., 1997, p. 1)
supports the idea that the individual cannot be separated from their social environment; it is a means of understanding social identity.

Organisational learning theorists are likely to explain context as ‘external’ to an organisation and develop strategies such as Force Field analysis (Lewin, 1951; DeSimone, Werner and Harris, 2002) and SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to analyse the impact of the ‘external’ environment on the ‘internal’ environment of the organisation (Bradford, Duncan and Tarcey, 1999). In studying collaboration between firms, social economists (Gulati, 1999; Easton, 1992) also understand context as ‘other’, that is, outside the relations between the firms but yet collaboration between firms contributes to an aspect of context, the economy.

In this thesis context is not understood as ‘other’, ‘external’ or situated, requiring an analysis of the situation in which institutional collaborative activity is taking place. Rather context is understood as contextual conditions.

1.1.3.1 Contextual Conditions

The term ‘contextual conditions’ is grounded in a dialectical materialist epistemology which addresses the dichotomy of the subject-object pattern or stimulus-response pattern (Leontyev, 1977) by understanding that there are relations between object and subject mediated by tools (Vygotsky, 1978). This is understood as activity, the subject is part of relations of society, influencing those relations, just as those relations influence the activity of the subject. In discussing activity and consciousness, Leontyev observes the interrelations between subject, activity and the system of relations of society:

Despite all its diversity, all its special features the activity of the human individual is a system that obeys the system of relations of society. Outside these relations human activity does not exist. How it exists is determined by the forms and means of material and spiritual communication that are generated by the development of
production and that cannot be realised except in the activity of specific individuals. It stands to reason that the activity of every individual depends on his [sic] place in society, on his [sic] conditions of life (Leontyev, 1977, p. 3).

The ‘system of relations of society’, that is, production, creates conditions which are part of human existence.

‘Conditions’ is a term also used by Ilyenkov (1960) and Marx (in Fischer, 1968). The contextual conditions identified in this thesis and explicated in Chapter Six, were developed from the analysis of the data and the review of a range of literatures and include:

- The capitalist mode of production and modes of production within capitalism
- History
- Hegemonic discourses
- Government policy
- Regional infrastructure and resources
- Stage of industry development
- Institutional arrangements

Relations of society, institutional collaborative activity and learning merge at the boundaries of institutions involved in collaborative work. Boundary crossing, encountering difference and boundary tools which facilitate the development of shared practices and understandings are key to this thesis and are expanded on in Chapter Six. The boundary-crossing literature does not separate learning from activity. The need to move away from learning as individual to collective, to recognise that learning occurs through activity and is influenced by and through relations in the activity requires a theoretical framework that moves away from the study of single phenomena. A theoretical framework that begins to take into account the ‘system of relations of society’ (Leontyev, 1977) and thus provides a means for the study of context or contextual conditions and their influence on learning and collective activity, is Cultural Historical Activity Theory, or as it is commonly referred to, Activity Theory. In this thesis, the work of activity theorists such as Engeström (1999), Blackler (1995), Leontyev (1977), Vygotsky (1978) and Ilyenkov (1960) is drawn on. Activity Theory is a central theoretical plank of
1.2 ACTIVITY THEORY

A brief historical overview of Activity Theory (Vygotsky, 1978; Leontyev, 1981) is provided here, followed by an account of activity systems (Engeström, 1987).

Vygotsky’s (1978) concept of mediated action shown in Figure 1.1 is a conceptualisation of the process of development and change. Vygotsky (1978) argued that stimulus response between subject and object is mediated by tools (cultural means and signs).

Leontyev (1981) further developed the idea of mediation using the concept of the social relations of production where the instrument of production, labour (Marx, 1973, p. 85) is ‘performed in conditions of joint, collective activity’ (Leontyev, 1981, p. 208). Engeström (1987) expanded on these concepts developing a graphic model of an activity system shown in Figure 1.2. An activity system can be any organisational form where there are stable rules and norms, represented from the perspective of the selected subject(s).

Figure 1.1 Mediated action

Mediating artefact or tools

Engeström’s (1987) model represents the relationship between individuals, their work colleagues and the activity in which they are jointly engaged and the factors that mediate these relationships (Blackler, Crump and McDonald, 1999, p. 7). Tools, the division of labour (division of tasks and power), rules (formal and informal – the explicit and implicit norms and conventions of the organisation) and community and the object itself mediate activity. There is constant interaction, renegotiation and movement between these nodes of activity. Need determines the production of objects (Davydov, 1990, p. 130). The object of activity expresses the motive, the purpose of the activity in society (Miettinen, 1998, p. 424).

Engeström (1999, pp. 4–5) summarises Activity Theory with the help of five principles:

1. The prime unit of analysis is the collective artefact-mediated and the object-oriented activity system, in its network of other activity systems. Activity systems realise and reproduce themselves by generating action and operations.

2. Activity systems are multi-voiced. Activity systems are a community of multiple points of view, traditions and interests. The activity system carries multiple layers and strands of history embedded in its artefacts, rules and conventions. The multi-voicedness is a source of tension and change.

3. Historicity is the third principle. Activity systems take shape and get transformed over lengthy periods of time. The history of an activity system will inform its future trajectory.

4. Contradictions are sources of change and development. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems. The primary contradiction of activities in capitalism is between use value and exchange value of commodities that pervades all elements of activity systems. When an activity system adopts a new element from the outside such as a new technology or a new object, it often leads to an aggravated secondary contradiction where some old elements, such as the rules, or division of labour, come into conflict. This can result in innovative attempts to change or transform the system.

5. Expansive transformation is possible in activity systems. As the contradictions of activity systems move over long cycles, some individuals begin to question and deviate from its established norms. In some cases this escalates into collaborative envisioning and a deliberate collective change effort, leading to a radically wider horizon of possibilities.
Engeström (1987, pp. 87–89) posits that there are four levels or layers of contradictions in the analysis of human activity. Contradictions or tensions develop when there are imbalances in the system. Imbalances will always exist; it is these and the resultant tensions and contradictions that result in change. Imbalances and tensions occur as a result of different developmental processes.

So, for example, a new tool in the form of new technology may be introduced that requires working differently with different ways of organising work. But the rules and the way labour and tasks are distributed in the system remain the same, or do not change at the time of the introduction of the new tool, creating tension between the nodes of tools and rules.

Each of the nodes that compose the activity carries historical experience within them and is reflective of the mode of production. In this way, Activity Theory systematically incorporates context into its frame of analysis.

- The primary (inner) contradiction is within each component of the central activity that is between exchange value and use value within each node of the activity.
- The secondary contradictions are between the constituents of the activity, that is, those appearing between the nodes. The hierarchical division of labour lagging behind and preventing the possibilities opened by advanced instruments is a typical example.
- The tertiary contradiction is between the object/motive of the dominant form of the central activity and the object/motive of a culturally more advanced form of the central activity.
• The quaternary contradictions are between the central activity and its neighbour activities. That is, those activities with which the activity interacts outside of itself but which are also embedded within it. The neighbour activities include first of all the activities where the immediately appearing objects and outcomes of the central activity are embedded (object activities). Secondly, they include the activities that produce the key instruments for the central activity (instrument producing activities). Thirdly they include activities like education and schooling of the subjects of the central activity (subject-producing activities). The quaternary contradictions are those that emerge between the central activity and the neighbouring activity in their interaction (Engeström, 1999, p. X).

The strength of an activity theoretical approach is that it is about the study of constantly changing relations of which learning is an integral part. Lektorsky (1980) explains the constantly emergent nature of activity and its object, and the critical nature of tools (‘external naturally emerging object – other man-made objects’) in the mediation of activity.

Marxist philosophy asserts that cognition is founded on practical activity...and must be understood as collective of joint activity, in which the individual enters upon definite relations with other persons, as mediated activity in which man places himself and an external naturally emerging object – other man-made objects – functioning as the implements of activity: And finally as a historically developing activity carrying in itself its own history (Lektorsky, 1980, p. 259).

A theoretical framework that builds in the mediation of history and of other human activities, on activity itself and cognition has strongly influenced the research design employed in this thesis.

1.3 RESEARCH DESIGN

This study employs an iterative, qualitative research process, employing activity as the unit of analysis through a case study of collaborative activity to provide richness and depth of data. As stated earlier in the chapter, the case study is of the Tasmanian information technology industry institutions and their collaborative activity. These institutions include:

• TasIT; an employer lobby group representing employers in the information technology industry and other organisations that are significant users of information technology
• The Department of State Development, a government department responsible for state economic development, including industry development
• Intelligent Island, the Board and secretariat set up by State and Commonwealth governments to allocate $40 million to the Tasmanian information technology industry, from the part-sale of a government instrumentality
• The Tasmanian Information Technology Industry Training Advisory Board (ITAB), (now defunct). Industry Training Advisory Boards were tripartite bodies of unions, employers and government established to identify industry skill and training needs
• Tasmanian Information Technology Industry Council, a government-appointed body
• Australian Computer Society (ACS), a professional body
• Tasmanian Council of Unions, the peak union body

There is an enormous array of literature that potentially adds to an understanding of collaboration, for example, the literature on social capital, studies of social partnership, literature on the different collective forms of learning and so on. For this reason a sampling approach was taken in selecting literature to be reviewed. The sampling was guided by the research questions that relate to conceptualising institutional collaboration as learning, and the ways in which contextual conditions mediate learning in institutional collaboration. Literatures on collective forms of learning reflecting collaborative activity in various modes, including team work, organisational learning, networking and studies of collaboration have been explored. These literatures add to our understanding of collaborative activity in that they identify a range of elements that are important for successful collaboration. The limitations of these literatures in relation to this thesis are discussed in Chapter two. It should be noted that some literatures have been explored in greater depth than others. For example, there is little discussion in this thesis of the literature on team work and organisational learning as they are limited in their contribution to the study of collaboration, context and learning. However because the networking literature often also accounts for institutional collaboration and/or collaboration within regions, this literature has been drawn on more extensively. More recent studies of collaboration have also been explored.

Contextual conditions are the other key aspect of these research questions. As noted earlier in this Chapter an activity theoretical approach has been employed in this study as it provides some basis for accounting for the mediation of context in collaborative activity. Studies in relation to context, explored in the literature
review in Chapter two are activity theoretical studies of various forms of collaborative activity.

Collaborative activity between institutions is conceived of as an actualisation of context in the social relations of production of the evolving collaborative activity. This thesis draws on the work of Marx in unfolding the social relations of production of a Marine ICT Cluster and three main institutions involved in the evolution of the Cluster. As the Cluster evolves perceptions of tensions and contradictions is an inevitable process of the mediation of context embedded in the social relations of production. Learning is inherent in these social relations.

Theory-building takes place though a number of stages, beginning with a study of the literature and a number of cycles of data-gathering and analysis. Data was collected in three stages using semi-structured interviews, some observation and the collection of relevant texts, such as minutes, reports and policy documents. Along with a range of data types, interviews were conducted from key personnel in each institution, providing multiple perspectives.

1.4 ORGANISATION OF THE THESIS

This chapter has provided an introduction to the major components of this thesis – institutional collaboration, collective learning and contextual conditions. In Chapter Two a review of the literature on collective learning, including the learning of teams, organisational learning, inter-firm networks, regional learning and institutional collaboration is undertaken. This literature is analysed for what it can contribute to institutional collaboration. Chapter Three develops the research design and methods used. A background and summary of summary the Tasmanian information technology industry is provided in Chapter Four. These introductory
chapters are followed by five findings chapters, with each of these chapters addressing a research question. These are followed by a concluding chapter.

The first findings chapter, Chapter Five, addresses the first research question describing the institutions in the Tasmanian information technology industry and the history of collaboration between them. Chapter Six addresses the second research question identifying seven contextual conditions and conceptualises institutional collaborative activity as taking place in the ‘boundary space’ shaped by the collaborative object. In Chapter Seven the influence of contextual conditions is explored through the evolving object and the interaction between institutions, addressing the research question: \textit{in what ways do contextual conditions influence institutional collaboration?}. The fourth research question: \textit{how can institutional collaboration be conceptualised as a learning process?} is addressed in Chapter Eight. This chapter suggests there are processes of institutional collaboration evident in collaborative production and that contextual elements influence these processes in different ways over time. The final research question: \textit{in what ways do contextual conditions mediate learning in institutional collaboration?} is addressed in Chapter Nine. The concluding chapter, Chapter Ten, summarises each of the findings chapters and briefly explores the implications of the findings.
2.1 INTRODUCTION

Learning, institutional collaboration and contextual conditions and their interrelatedness require a conceptualisation of learning as collective, rather than individual, as identified in Chapter One. The dearth of literature about institutional collaborative activity requires a search for literatures from a variety of other sources. Following a review of recent literature on collaboration, this chapter explores these collective learning literatures.
2.2 THE COLLABORATION LITERATURE

Literature on collaboration has grown in recent years (Couchman & Beckett, 2006). The increase in the extent of this literature is perhaps attributable to the growing importance of collaboration for social and economic well being. This section of the literature review provides an overview of this literature on collaboration. The literature analysed here has been categorised into two types of literature; these being literature about managing collaboration and literature about intra and inter organisational collaboration. Table 2.1 summarises the key characteristics of each of these types of literature and identifies the key contributions and problematic of the literature in relation to this thesis.

The literature classified as managing collaboration (Barnes, Pashby & Gibbons, 2002; Couchman & Beckett, 2006; Reynolds, McCormack, Ferguson-Patrick, 2005; Scott, 2004; Vangen & Huxham, 2003) provides frameworks and guidelines for leaders managing collaboration in a variety of settings. The literature focuses on what are recurring themes in much of this type of literature on, namely communication and coordination (Reynolds, et al, 2005; Scott, 2004), establishing trust and issues of power (Barnes, et al, 2002; Vangen & Huxham, 2003); knowledge exchange (Barnes et al, 2002) and shared objectives or purpose (Barnes et al, 2002; Scott, 2004; Vangen & Huxham, 2003).

Important to this thesis is that collaboration is understood as a tension laden process as a result of the bringing together of diverse organisations with different purposes and cultures. Given that this thesis investigates learning in collaborative activity this is significant. Significant because it is through the resolution of tensions, the interaction between thesis and anti-thesis, typical of a dialectical materialist ontology taken in this thesis, that not only do the individuals involved learn, but the participating organisations and the collaborative arrangement itself as an entity learn.
<table>
<thead>
<tr>
<th>Type of literature</th>
<th>Authors</th>
<th>Key characteristics</th>
<th>Contributions to this thesis</th>
<th>Problematic of the literature in relation to this thesis</th>
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<tr>
<td>Managing collaboration</td>
<td>Barnes, Pashby &amp; Gibbons, 2002; Couchman &amp; Beckett, 2006; Vangen &amp; Huxham, 2003</td>
<td>This literature provides frameworks and guidelines for leaders for managing collaboration These authors claim that: Collaboration provides access to various forms of advantage for the participating organisations e.g. knowledge, technologies, opportunities (Barnes et al, 2002; Couchman &amp; Beckett, 2006; Vangen &amp; Huxham, 2003) Collaboration enables greater access to knowledge and technologies (Barnes et al, 2002) and solutions to social problems (Vangen &amp; Huxham, 2003) Collaboration is vexed, bringing together diverse organisations inevitably resulting in tensions (Barnes, Pashby &amp; Gibbons, 2002; Couchman &amp; Beckett, 2006; Vangen &amp; Huxham, 2003) Inward orientation, focusing on recurring themes (in this literature) in collaboration such as objectives, knowledge exchange, decision making processes, trust and power (Barnes, et al, 2002; Couchman &amp; Beckett, 2006; Vangen &amp; Huxham, 2003) Trust, commitment, planning and experience are key foci (Barnes et al, 2002) The external environment needs to be managed (Barnes et al, 2002; Vangen &amp; Huxham, 2003)</td>
<td>Collaboration is a tension laden process Diverse organisations bring into the collaborative activity different cultures and aims and objectives Political environment is recognised as a factor in collaborative activity Where there is a history of mistrust between collaborating partners it is noted that this impacts negatively on the collaborative activity</td>
<td>The literature has a different ontological perspective to that taken in this thesis. This literature recognises collaboration as a developmental process, but does not perceive this development as learning. Thus the literature overlooks the dynamics, complexities and interactions of development and change. For example, when there is tension between the aims of each organisation, rules of engagement and intent and evolving rules of the collaboration. The focus of this literature is the management of collaboration by leaders. While there is some acknowledgement of contextual issues such as history of engagement and the political environment, the specific tensions and enhancements are not explored.</td>
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<tr>
<td>Type of literature</td>
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<td>Intra and inter organisational collaboration</td>
<td>Slaughter &amp; Archerd, 2004</td>
<td>University participants in collaboration with industry display limited conscious awareness of tensions they faced, and their location in the market place Policy contributes to shifts in boundaries and discourses Challenges to professional norms and values, as a result of working across boundaries, lead to quandaries about professional identities</td>
<td>Provides an example of the relationship between policy and discourses The extent to which the tensions are experienced by subjects appears to be related to the division of labour (where subjects are in the hierarchy)</td>
<td>There is an over generalisation from the experience of the academics interviewed and the extrapolation of this experience to its impact on relations between university, state and market</td>
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<td>Reed, 2001</td>
<td>Trust is a form of control exercised through the structures of collaborative relations through which forms of expert power can be explained Trust cannot be thought of separately from power Trust is not a coordinating mechanism based on shared values and norms</td>
<td>History, ideology, language and discourses may be factors to consider in a study of collaborative activity, learning and context)</td>
<td>Ontologically this realist study posits that social structures are enduring. Realism relies on casual explanations which limit an understanding of collaboration as multi-dimensional, complex with interacting factors.</td>
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<td></td>
<td>Engeström, Engeström &amp; Vähäaho, 1999;</td>
<td>Asymmetrical power relations between actors in an institutional setting, contribute to tensions New tools result in tensions between tools and the object of activity There are three dimensions of knotworking, the socio-spatial, the temporal dimension and the ethical</td>
<td>The ethical dimension highlights the constantly changing distribution of power and control, the changing division of labour and the rules of engagement. Notes the contradiction</td>
<td>Although the broader context is noted in the mention of the contradiction between use value and exchange value the implications of this within the collaborative activity are not explicitly explored.</td>
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<td>Type of literature</td>
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<td>Blackler &amp; Crump, 2000</td>
<td>dimension</td>
<td>between use value and exchange value</td>
<td>Analysis of collaborative activity is within the situated context, not the socio-economic and political context</td>
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<td>Engeström, (1999) note the need for activity theory to explore the “communicative and instrumental aspects of tools and also ways to understand different types of trajectories and the points of small but reflective learning. Cooperative relations between communities of activity are mediated by the process of ‘perspective taking, perspective making and perspective shaping</td>
<td>Blackler et al (2000) provide a lens for uncovering the cultural assumptions people are working with and in. Perspective making etc. may be a useful analytical tool</td>
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<td></td>
<td></td>
<td>Blackler et al (2000) notes the need to explore the influence of ‘boarder socio-structural, historical and cultural factors in collective work practices</td>
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However, in the managing collaboration literature the ontological perspective focuses on recurring issues in collaboration and how to manage these issues. Thus in this literature aspects of learning are overlooked; collaboration is portrayed as developmental, but not as learning. As a result, the literature overlooks the dynamics, complexities and interactions of development and change. Some of the intra (that is, literature on boundary crossing within organisations), and inter organisational literature on collaboration (that is, literature on networking and institutional collaboration across organisations) offers quite a different perspective, as outlined in Table 2.1. Engeström (1999; 1995) for example, conceives of learning in and across organisations as boundary crossing, which results not only in the exchange and creation of knowledge, but the generation of spaces and encounters for learning. In the process, argues Engeström (1999) the tools used in the process of working towards the object of the work are broadened, as is the object of work itself. In this literature collaboration is constructed as a learning process.

A study of a particular type of collaborative activity that is termed as knotworking Engeström, et al (1999) – when people from different organisations come together to perform a task – elaborates these ideas further. Knotworking is so called because control is distributed across the knot of actors. Control passes from actor to actor from one point in time to the next depending on the tools being used, and the rules being invoked. Each actor represents their own “collective” or activity system (p.354). Engeström et al (1999) argues that knotworking can be represented along a number of dimensions. These are the:

- Socio-spatial dimension depicting the different activity systems involved at any point in time (p.354);
- Temporal dimension where participating activity systems move in and out of the knot over time as the steps of the knotworking episode unfold
- Ethical dimension involving “redistribution and reconceptualisation of control, responsibility, and trust” (p.355)

Inherent in this conceptualisation is the concept that learning is part of everyday activity. In this instance, learning involves “redistribution and reconceptualisation”, as
part of what has been conceived as the ethical dimension. Also important to this thesis is the collective focus, rather than the individual focus evident in much of the managing collaboration literature (e.g. Barnes et al, 2002; Couchman & Beckett, 2006) and in the work of Slaughter and Archerd (2004) discussed below.

The ethical dimension, note these authors, operates outside the accepted forms of hierarchy and classification to be found in the participating activity systems. The ethical dimension addresses the distribution of power and control, the constantly changing division of labour and the rules that govern the division of labour. In non-stable collaborative activity neither the division of labour nor the rules are ongoing, rather they evolve as required and are in a constant state of flux. The managing collaboration literature conceives of issues of power and control as relating to trust. Trust is highlighted in the managing collaboration literature as critical in the management of collaboration. Trust, however, is not one dimensional and is more complex than recognising that trust evolves over time. Trust is context specific, related to the particular participating organisations or activity systems, the mediating rules, culture and thus the power dynamics. The object also mediates trust. As indicated in the example above, the ethical dimension is a constantly moving and evolving dimension; it is not fixed or linear.

In the intra and inter organisational collaboration literature Reed (2001) suggests that trust is a form of control exercised through the structures of collaborative relations through which forms of expert power can be explained. Trust he claims is not a mechanism based on shared values and norms, rather trust cannot be conceived as separate from power. This suggests that attempting to achieve shared norms and values in a collaborative activity is not necessarily achievable. Rather, as Reed (2001) suggests history, ideology and language will influence what the managing collaboration literature call trust; as does what Engeström et al (1999) refer to as the ethical dimension.
Reed (2001) posits that social structures are enduring, that history, ideology and language contribute to these structures. As a self-proclaimed realist, Reed (2001) also relies on causal explanations. Causal explanations however are problematic as they are limited in their account of the dynamic interactions within collaboration. The dynamic nature of collaboration constantly changes relations within the collaborative activity, making a cause and effect explanation problematic.

Other authors in the intra and inter organisational collaboration literature such as Blackler and Crump (2000) (see Table 2.1) note there is a need to explore the influence of broader socio-structural, historical and cultural factors in collective work practices. In a study of collaboration between academics and industry partners, Slaughter and Archerd (2004) found that changing funding patterns and the role of globalisation and global markets are key factors in the tensions experienced by academics in their interaction with industry. These tensions, claim these authors, lead to quandaries about identity when researchers work closely with industry, throwing up issues of disclosure versus publication and ownership of intellectual property. This qualitative study across 14 institutions in the United States using semi-structured interviews (n=38) highlights the ways in which policy and discourses mediated relations of collaborative activity. In this study the collision between the availability of funding, an outcome of policy, and the discourses of basic and applied science and discourses of competitiveness challenged professional norms and values. The tensions between discourses resulted for many of those interviewed in a changing identity and role as researcher, from, for example, publishing to patenting; patenting traditionally being done by industry. These contextual factors, much broader than the situated contextual analysis of Engeström et al (1999) and Blackler and Crump (2000), are important to this thesis. Slaughter and Archerd (2004) illustrate that context does indeed mediate relations and identities within collaborative activity. Policy, highlighted in the Slaughter and Archerd (2004) study is an outcome of dominant discourses and ideology referred to in the Reed (2001) study. Although the Slaughter and Archerd (2004) study overgeneralises its findings, moving from a
discussion of identity and tensions within the collaborative activity, to the impact of policy and globalisation, it serves as a useful reminder of the need to investigate the mediating influence of broader contextual factors. Engeström et al (1999) note fundamental societal contradictions, indicative of the broader context; however, these authors do not explicitly explore the ways in which these contradictions mediate the collaborative activity. Rather they focus on the situated context.

In summary, recent literature on collaboration provides useful insights for this thesis of the learning that occurs through collaboration suggesting that conceptualising institutional collaboration as learning provides a useful lens through which to better understand the processes and complexities of collaboration. Such a lens would add to the lessons of how to collaborate from the managing collaboration literature by conceptualising the complex and dynamic nature of collaboration as a process of learning. This is addressed in Chapter eight. The literature analysed above also strongly suggests that broader contextual factors mediate collaboration and therefore learning in the collaborative activity. This begs the questions, what contextual conditions mediate institutional collaboration and in what ways do these conditions mediate the collaborative activity? What contextual conditions mediate collaborative activity is addressed in Chapter six, and chapter seven addresses the question of the ways in which these conditions mediate collaborative activity.

Given that the literature on collaboration is quite recent, a range of other literature on collective learning is explored in the remainder of the Chapter; in particular team, organisational learning, networking, regional and institutional literature. Also included in the following is a brief review of the socio-cultural and activity theoretical literature and its contribution to this thesis. The final part of the chapter considers features of collective learning drawing on these same literatures.
2.3 **COLLECTIVE LEARNING**

This section identifies a number of characteristics of collective learning, setting up Section 2.3 which gives a more detailed account of each of these characteristics.

As stated in Chapter One, in this thesis learning is construed as collective, because institutions working at the boundary are working collectively. Collective learning is learning in and through a group working across similar or different organisations or groups. Collective learning is core to this thesis and thus it is important to examine what is already known about collective learning in its various formulations. This review of literature examines literature that involves studies of what is typically thought of as collective in nature; namely teams, organisations, networked firms, regions and institutions. All these types of literature of collective learning have something to contribute to collaborative activity across multiple institutions with different histories, practices and purposes.

This section reviews the networking, regional institutional literature as well as the team and organisational learning literatures which are summarised in Table 2.1. A brief discussion of socio-cultural and activity-theoretical literatures follows. As indicated in Chapter One, these perspectives are critical to this thesis and are summarised in Table 2.2. It should be noted that each type of literature is not discussed in the same level of detail.

**2.3.1 THE TEAM LITERATURE**

As listed in Table 2.1, the team literature identifies that diversity (Guzzo and Dickson, 1996; Jackson, May and Whitney, 1995), information exchange and sequencing are aspects of coordination in effective team work (Dodgson, 1993).
These characteristics are factors in the development of strong shared mental models which additionally requires the ability to question assumptions and develop understanding of one another’s viewpoints, roles and experiences (Kline, 2005). Factors to be considered in teams that self-assemble include team size, which affects the degree of support, the proportion of newcomers and the tendency of participants to repeat previous collaborations (Guimera, Uzzi, Spiro and Amaral, 2005). These factors are useful to consider as aspects of collective learning, but in this literature are considered in isolation from the interaction of teams with other organisational entities. Donnellon (1996, p. 8) suggests that a socio-linguistic approach to identify the recurring patterns in the language and culture of particular groups and the influence of the underlying meanings that shape those patterns meets the challenges in understanding the interactions and tensions within teams. Such a perspective appreciates context and learning as integrated. The argument that underlying meanings shape recurring patterns suggests that interactions and tensions in teams are influenced by cultural factors not readily visible to participants.
Table 2.2: Contributions and problematic of bodies of collective learning literatures

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<thead>
<tr>
<th>Type of literature</th>
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<th>Key characteristics</th>
<th>Contributions to this thesis</th>
<th>Problematic of the literature in relation to this thesis</th>
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<tr>
<td>Team literature</td>
<td>Jackson et al., 1995; Guzzo &amp; Dickson, 1996; Donnellon, 1996; Kline, 2005; Guimera et al., 2005</td>
<td>Types of diversity Coordination is a function of effective communication Informal communication is a characteristic of socially cohesive teams Goal-setting enhances coordination and communication Culture shapes patterns of interaction</td>
<td>Diversity as a feature of collective learning Coordination and communication are required for collective learning Cultural influences are readily visible to participants</td>
<td>Teams in relation to other entities are often not considered</td>
</tr>
<tr>
<td>Organisational learning literature</td>
<td>Dixon, 1992; Dodgson, 1993; Nonaka &amp; Takeuchi, 1995; Marsick et al., 2000; Sefton, Waterhouse &amp; Cooney, 1995; DeSimone, Werner &amp; Harris, 2000; Rodríguez, Pétrez &amp; Pardo del Val, 2003; Lehesvirta, 2004</td>
<td>Learning is classified as a series of information processes Learning is a response to external, competitive environment Collective learning is important for innovation and involves critical reflection, learning from experience and group problem-solving Culture and structure influence learning HRD learning interventions are individual and systemic Organisational learning is through purposeful, everyday activity where knowledge is interpretatively constructed Social relationships, social settings and their practices are influenced by rules, norms, language and assumptions Objects, tools, symbols, systems contribute to local meaning and solutions</td>
<td>Information flow and knowledge creation is important to collective learning Learning occurs through everyday activity Rules, norms, language and discourses influence and are influenced by practices and settings Objects, tools, symbols, systems contribute to local meaning</td>
<td>Tensions and challenges are often not considered Unit of analysis is the individual, team or organisation, limiting the study of interrelationships</td>
</tr>
<tr>
<td>Networking literature</td>
<td>Granovetter, 1973; Ashman, Brown &amp; Zwick, 1998; Gulati, 1999; Camagni, 1991; Walzer, 1996; Fleck, 1996; O’Reilly &amp; Chatman, 1996; Laere &amp; Heene, 2003</td>
<td>Strong ties provide social cohesion and weak ties provide new resources Skill and knowledge, risk sharing reciprocity result from networking Common bonds can develop over time increasing information sharing and knowledge creation Social control is anchored in formal systems and personal relationships</td>
<td>Diversity of ties provides cohesion and resources Information flow encouraged by common bonds Control is within and through systems and personal relationships</td>
<td>Development of trust and a common language are often considered unproblematic</td>
</tr>
<tr>
<td>Regional/institutional</td>
<td>Lorenz, 1992; Putnam, 1993; Easton &amp;</td>
<td>Maintenance of reciprocity is dependent on shared beliefs Previous experience develops skills in working with</td>
<td>Shared beliefs and mental models Previous experience of</td>
<td>Sharing and trust is often treated as</td>
</tr>
<tr>
<td>Type of literature</td>
<td>Authors</td>
<td>Key characteristics</td>
<td>Contributions to this thesis</td>
<td>Problematic of the literature in relation to this thesis</td>
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<tr>
<td>Problematic of the literature in relation to this thesis</td>
<td>Araujo, 1992; Booz, 2000; Kitson &amp; Michie, 1998; Keeble et al., 1998</td>
<td>multiple, diverse perspectives and ambiguity Information flow increases with trust and open dialogue Working across boundaries requires high level skills in e.g. developing compliance to achieve goals Firms work together in a region to meet a need to be competitive Shared language and mental models developed through coordination and planning Common problem-solving heuristics and decision-making routines are developed</td>
<td>collaboration Boundary spanning Collaboration occurs in order to meet a need Information flow increased through trust</td>
<td>unproblematic, ignoring tensions and challenges</td>
</tr>
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<td>Table 2.3: The contribution and problematic of different theoretical orientations</td>
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<tr>
<td>Type of literature</td>
<td>Authors</td>
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<tr>
<td>Situated cognition literature</td>
<td>Lemke, 1997; Krishner [??] &amp; Whitson, 1997</td>
<td>Knowledge has local meaning Objects, tools, symbols systems contribute to local meaning and solutions</td>
<td>Objects, tools and systems contribute to meaning</td>
<td>Context is limited to the immediate, local setting</td>
</tr>
<tr>
<td>Socio-cultural literature</td>
<td>Wenger, 1998; Lave, 1996; Brown &amp; Duguid, 1991; Billett, 2001</td>
<td>Social relationships, social settings and their practices are influenced by rules, norms, language Participation in a community of practice is a process of moving from the 'edge' to the centre of the practice Learning is through enculturation Knowledge is interpretatively constructed through purposeful, everyday activities</td>
<td>Interconnectedness of settings, rules and norms Movement from edge to centre as enculturated into a practice</td>
<td>The mediation of social, economic, political and environmental contextual influences tends not to be considered</td>
</tr>
<tr>
<td>Activity Theorists</td>
<td>Blackler, Reed &amp; Whitaker, 1993; Wertsch, 1998; Engeström, 1999; Engeström, Engeström &amp; Vahaaho, 1999</td>
<td>Knowledge in organisations is a normalising practice Contexts are part of cultural tools Activity is mediated by cultural, historical and institutional contexts Expansive learning cycle Collaborative activity meets a need or motive Follow the object</td>
<td>Collaborative activity meets a need Context is embedded in tools Context mediates activity</td>
<td>What is meant by cultural, historical and institutional contexts is underdeveloped</td>
</tr>
</tbody>
</table>
2.3.2 Organisational Learning Literature

Early organisational learning literature was promulgated as occurring ‘through the medium of individual members’ (Shrivastava, 1983, p. 7). In later organisational learning literature, learning is more likely to be defined as a process, focusing on the system (organisation) rather than the individual (Dixon, 1992, p. 31), although the metaphor of individual learning is deeply embedded in this body of literature (Dodgson, 1993, p. 380). In the human resource development literature (DeSimone, Werner and Harris, 2002; Stone, 2002), context is considered to be ‘the system’, influencing the work and learning of organisational members. It is a factor to be taken account of, and itself becomes a focus of learning interventions, such as management training and development of reward systems.

Organisational learning literature spans the terrain of individual learning within a given context, referred to as situated learning (Kerka, 1997, p.2) and learning as a collective process related to the processing and acquisition of knowledge and the improvement of results (Rodríguez et al., 2003). Betts and Holden (2003) argue that there must be awareness of organisational power patterns for effective collective learning. Collective learning has also been identified as important for innovation (Nonaka and Takeuchi, 1995). The acquisition of information and how information is treated in organisations is a recurring theme in this literature (e.g. Lehesvirta, 2004). Dixon (1992) and Lehesvirta (2004) draw on the work of Huber (1991) to examine the acquisition, distribution and interpretation of information to make meaning of this information, to create knowledge. This range of concepts suggests that collective learning is a process involving power relations affecting the distribution and interpretation of information to create knowledge. This is important to this thesis, as it is indicative of more complex interrelationships within a given environment.

Learning in this literature is often constructed as social and constructivist in a variety of ways. The literature identifies strategies such as critical reflection, learning from experience, getting together in groups to solve problems (Marsick et al., 2000). Argyris and Schön (1978, 1996) use the terms ‘single loop learning’ (where routine changes, but original interpretations are not challenged) and ‘double loop learning’
(the way in which values, beliefs and assumptions frame a problem, leading to questioning and potentially deeper change) to understand change across a system. In their framework for investigating workplace learning and change, Sefton, Waterhouse and Cooney (1995, p. 62) suggest that collective processes are important for learning such as facilitating knowledge transfer across the organisation, embedded knowledge, the development of trust, organisational openness and development for all in the organisation. Billett (2001, p. 21) identifies learning in organisations as occurring through engagement in ‘conscious goal-directed everyday activities’ where individuals interact and construct knowledge. Individual strategies for learning are constructed into collective processes involving communication, knowledge interpretation and everyday activity. Characteristics of organisational learning defined as single or double loop learning, critical reflection, trust, openness, engagement in goal-directed activity are useful in identifying the ideal, and what to aim for in developing collective processes. However, when understood only in this way tensions and challenges that are inevitable parts of collective endeavour, are ignored. The unit of analysis in these studies is the individual, the team or group and/or the organisation. While this deepens an understanding of the development of individuals, the team or group and/or the organisation, it does not contribute to an understanding of how these units relate to other contexts.

2.3.3 Networking Literature

Networking literature (Granovetter, 1973; Mizruchi and Galaskiewicz, 1993; Ashman, Brown and Zwick, 1998; Walzer, 1996) focuses on ties or links between actors. The purpose of these ties is to improve competitive outcomes through gaining access to knowledge and resources for the firms or groups involved (Laere and Heene, 2003; Gulati, 1999). The development of trust is considered important in the development of common problem-solving heuristics, coordination routines and decision making (Camagni, 1991). Learning is understood in various ways from a discussion of individual traits and their influence on what takes place in networks, such as an actor’s tolerance for ambiguity (Booz, 2000) or differences in the behaviour of actors in different networks (Easton and Araujo, 1992), to the development of common language and problem-posing and problem-solving
heuristics (Camagni, 1991). The development of trust and common language are features frequently mentioned in this literature and are obviously critical to effective collective learning. However, the development of these features of collective learning is often considered as unproblematic; consequently strategies for addressing the building of trust and common language and working through tensions are not readily evident in this literature.

2.3.4 REGIONAL AND INSTITUTIONAL LEARNING

The literature on regional learning and institutional learning is combined here, as much of the regional learning literature is inclusive of institutions. Social economists (Keeble et al., 1998; Lorenz, 1992; Camagni, 1991; Amin and Thrift, 1994) identify factors as diverse as the development of a common language (Camagni, 1991); ‘institutional thickness’ (Amin and Thrift, 1994), and knowledge flow as a result of movement of labour within the region (Keeble et al., 1998). Trust (Lorenz, 1992) and reciprocity (Putnam, 1993) are just some of the factors affecting information flow and exchange. The focus is not on the attributes of individual actors but on the collective interaction in the region and what encourages innovation, including contextual factors such as the mode of production. Interaction between participants is fundamental to collective learning between participants with different histories, practices and purposes. However, as with the networking literature, the development of trust is considered to be unproblematic.

In summary, each of these different literatures, team, organisational learning, networking, regional and institutional, have specifics to contribute to the concept of collective learning. Common themes in the brief summaries of these literatures include diversity, coordination and decision making, information exchange, common or shared understandings and trust. What is common in these literatures is a focus on characteristics, features or processes of learning. Rarely do these literatures consider the interrelationships contributing to the shape and influence of these characteristics, features and processes on each other and in relation to other organisational entities.
Theorists with a different orientation and perspective to studies discussed so far include socio-cultural and activity theorists.

### 2.3.5 Socio-Cultural and Activity Theoretical Perspectives

A different unit of analysis is used in much of the socio-cultural and Activity Theory literature from the units of analysis used in the literature discussed above. Blackler (1995, 1993) for example, takes the phenomena of knowledge and knowledge work in organisations, positing it as a discourse and normalising practice. Socio-cultural theorists (Lave, 1996; Brown et al., 1991; Wenger, 1998), like Blackler, emphasise social relationships, social settings and practices within them, suggesting that rules, norms, language and discourses influence activity. Wenger (1998) explains that theories of social practice are concerned with everyday activity and the social systems of shared resources used by the group, mutual relationships and interpretations of the world. Wenger adds that theories of social structure emphasise cultural systems, discourses and history. Wenger (1998) and Lave (1996) understand learning through communities of practice, moving from legitimate peripheral participation to the centre of the community or social practice. In the process, learners are ‘enculturated’ (Brown et al., 1991) into social practices in the setting of the activity under investigation.

This conceptualisation integrates context, activity and learning, as constituting each other and as dynamic, flexible and changing (Lave, 1996, p. 5). That learning takes place is not problematic, what is problematic is what learning takes place. Settings, social relationships within these settings and the practices and tools through which learners interact become the focus of study in the socio-cultural literature. When interaction, and the relations of the activity, become the focus of study, there are possibilities for understanding what takes place, as dynamic and interconnected.

Using an ecological perspective Lemke (1997) extends an understanding of context beyond the boundaries of situated activity. Lemke, for example, suggests that as people are participating in everyday practice they are:

functioning in microecologies, material environments endowed with cultural meanings; acting and being acted on directly or with the mediation of physical-cultural tools and
cultural-material systems of words, signs, and other symbolic values. In these activities, ‘things’ contribute to solutions every bit as much as ‘minds’ do; information and meaning is coded into configurations of objects, material constraints, and possible environmental options, as well as in verbal routines and formulas or ‘mental’ operations (Lemke, 1997, p. 38).

Tools, language and symbols are important mediators of context. Whitson and St Julien (1997, p. 40) argue that biography, history and culture act in everyday activity and thus mediate learning. These authors suggest that the dynamics of any ‘ecosystem’ depends on the networks that link, couple and connect this element with that and make this interdependent with that. Economics, politics, societal values and beliefs needs to be taken into account, they argue. It is not just the immediate setting, but the global structure and dynamics of the systems, that constitute what we become (St Julien, 1997). St Julian’s (1997) claim is important to this thesis showing that learning and context cannot be separated, but are one and part of the same thing. There is a clear link between this literature and the literature of cultural historical activity theorists.

For cultural historical activity theorists (Wertsch, 1998; Engeström, 2004; Miettinen, 1998) the unit of analysis is activity. Wertsch (1998, p. 18) posits that activity is mediated by the cultural, historical and institutional contexts in which it takes place and that contexts are embedded in the cultural tools (e.g. textual resources) that mediate activity. Wertsch uses mediated action as the unit of analysis in recognition of the role played by mediational means or cultural tools, terms used interchangeably. In discussing co-configuration work Engeström (2004, p. 16) suggests learning is embedded in major transformations, innovations, implementations; it is across loosely interconnected activity systems and terrains taking shape as renegotiation and reorganisation of collaborative relations and practices and as creation and implementation of corresponding concepts, tools, rules and entire infrastructures. Tools of collaborative activity are termed boundary tools or instrumentalities (Engeström, Puonti and Seppänen, 2003). The difference between Engeström et al.’s data and the data collected for this thesis is that they are writing about collaborative activity that is part of the work of activity systems such as public institutions (e.g. tax, police, law enforcement) that have in common established practices and values around public service and ways of working. This thesis is about collaborative activity
between institutions with very different histories and purposes with limited or no common values and practices.

These theorists further develop the socio-cultural perspective, not only focusing on learning as the interaction of community members, but the activity and relations of activity as it is mediated by tools, rules, division of labour and communities of practice.

Objects are complex and difficult to identify, partly due to the dynamic nature of the object over time, also because the different levels of activity and action can lead to confusion. However, perhaps confusion is due primarily to the difficulty of understanding activity as collective and individual forms, that is, individuals acting; act within and as part of a social form (Davydov, 1999, p.41).

The question for this thesis is how to understand objects in object mediated activity such as collaborative activity, as opposed to *activity systems*? Engeström & Escalante (1996) note that an object of activity is both something given and something projected or anticipated. The subject constructs the object of activity, and singles out these properties that prove to be essential for developing social practices in particular contexts. Therefore, the object of activity manifests itself in different forms for different participants and at different moments of the activity. This understanding of object is at the level of action carried out by individuals or groups and is perceived by the individual or group subject as goals (Leont’ev, 1978) to reach in order to meet the object of activity. Leont’ev (1978) notes that at the level of activity the object/motive is carried out by the community. There is a blurring between the discussion of object as typified by Engeström & Escalante above and as described by Leont’ev.

Cultural historical activity theorists, including those referred to above, draw on the work of Marx. It is therefore useful to return to Marx in an attempt to clarify this issue. In his discussion of production Marx notes

> Production is… consumption, consumption is also immediately production. Each is immediately its opposite. But at the same time a mediating movement takes place between the two. Production mediates consumption; it creates the latter’s material; without it consumption would lack an object. But consumption also mediates
production, in that it alone creates for the products the subject for whom they are products. A railway on which no trains run, hence which is not used up, not consumed, is a railway potentially, and not in reality… Consumption produces production in a double way, (1) because a product becomes a real product only be being consumed. … Only by decomposing the product does consumption give the product the finishing touch; the product is production not as objectified activity, but rather only as object for the active subject; (2) because consumption creates the need for new production, that is, it creates the ideal, internally impelling cause for production, which is its presupposition. Consumption creates the motive for production; it also creates the object which is active in production as its determinant aim. (Marx, 1973, p.91)

This explanation by Marx on the dynamic mediating relationship between production and consumption explains the apparent confusion in the use of the term object. There is the object or motive which is the ‘impelling cause for production which is its presupposition’, and there is also the object of consumption, produced by production. The object only becomes ‘real’ when it is consumed or used.

A useful differentiation then between the object or motive which is the “impelling cause for production” and the object produced, is to refer to that which is being produced for consumption as the object of production, and that which is the presupposition for production, object of activity.

In summary, both learning and context are dynamic and interactional. Seddon (1994, p. 196) suggests that a focus on the dynamic processes of formation and transformation is required. For Seddon what is important is not what drives these processes and practices, but how they are formed within a historically specific pattern of social relations and with what effects. History, social relations, cultural and institutional contexts are important concepts for this thesis; they inform what context is and that these aspects of context mediate activity. The historical period, notes Seddon, offers particular possibilities and constraints, and in knowing the context in which activity takes place, so there is the ability to shape, form and transform practices:

Our practice in education, in research, teaching, policy and practical politics, is then a contemporary participation in processes of social change. It becomes part of and contribution to wider social questions about what constitutes a good life and how that end might be pursued (Seddon, 1994, p. 197).
The next section explores the common themes identified in the literature discussed so far, and employs the perspectives identified above to assist in the process of identifying the problematic and contributions to this thesis.

2.4 FEATURES OF COLLECTIVE LEARNING

The common themes of collective learning identified in Section 2.2 provide the structure to the remainder of this chapter. These features are:

- Diversity
- Coordination and decision making
- Information flow and knowledge creation
- Common or shared understandings
- Trust and support.

The contributions and problematic of the literature and relevance to the feature under discussion are summarised in Tables 2.3, 2.4, 2.5, 2.6 and 2.7.

2.4.1 DIVERSITY

Diversity is integral to collaboration between institutions, as participants in institutional collaboration are often from different histories, experiences, practices and perspectives. In the team literature there are contradictory views of the impact diversity has on the effectiveness of the collective learning of a group. On the other hand, the networking and regional/institutional literature suggest that diversity has a positive impact.

<table>
<thead>
<tr>
<th>Contributions to this thesis</th>
<th>Problematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversity can increase tension (Rodríguez et al., 2003)</td>
<td>Identifies the influence of aspects of diversity, but does not indicate how these aspects are developed, how the individual and the collective learn and develop</td>
</tr>
<tr>
<td>Previous diverse experiences (Owen &amp; Bound, 2003) assist with the development of collaborative skills (Putnam, 1993) and tolerance for ambiguity (Booz, 2000)</td>
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<tr>
<td>Diverse networks provide access to varied knowledge and resources (Gulati, 1999; Mizruchi &amp; Galaskiewicz, 1993)</td>
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</table>
The team literature includes studies of group design variables (Guzzo and Dickson, 1996, p. 310) as well as studies which account for ‘contextual variables such as automation in airline crews or the limited time of their existence as a unit’, requiring crews to develop relationships quickly (Guzzo and Dickson, 1996, p. 317). The need to develop relationships quickly is a feature of collaboration between institutions, where participants come together for the life of a project, and then disband and perhaps reform in different configurations with different members for another purpose or project. Driver (2003, p. 152) suggests that there is an optimum level of diversity in effective groups. Such groups must find appropriate value congruence and cohesion and develop processes and structures that allow for high levels of participation. These challenges that diverse groups face are not well explored in the literature, even by those (Foldy, 2004, p. 530) who claim that such diversity is a resource for learning and growth.

Cultural differences and diversity between organisations increase difficulties in the interaction between them, for example, conflict in addressing different organisational and administrative practices and the interpretation and response to strategic problems (Rodríguez et al., 2003). Interaction between institutions with different histories and practices can be expected to be conflictual. Rodríguez et al. (2003) suggest that cultural differences need to be part of cooperation agreements. This formal solution does not explain how such an agreement can be enacted to address tension where and when necessary.

In the literature interfirm discussing networking, varied or diverse experience across organisations is considered valuable as experience across organisations exposes the actor to a variety of operational methods, values and cultures (Owen and Bound, 2001). Previous experience in working with others develops skills in working with diversity such as developing civic responsibility, of listening to different perspectives and participating effectively:

Participation in civic organizations inculcates skills of cooperation as well as a sense of shared responsibility for collective endeavours… [when individuals belong] to cross-cutting groups with diverse goals and members, their attitudes will tend to moderate as a result of group interaction and cross pressures (Putnam, 1993, p. 90).
Granovetter (1973), Ashman et al. (1998) and Walzer (1996) view access to networks that incorporate people and organisations with different backgrounds and experiences as an enabling factor in operating effectively in a complex society. Diversity in networks is considered to bring with it knowledge, resources, and a mix of loyalty and trust. Weak ties in networks (Granovetter, 1973) bring with them access to resources (Gulati, 1999, p. 398), skills and knowledge (Hanssen-Bauer and Snow, 1996) and allow for the sharing of risk (Tallman and Atchinson, 1996, p. 371). Where there are strong ties (Granovetter, 1973) common bonds are shared, the relationship has endured over time, the participating firms have similar social identities, and exchange reciprocal services; trust and reciprocity are high. Unlike weak ties, strong ties restrict the range of available strategies and development of strategies (Mizruchi and Galaskiewicz, 1993).

In the networking literature it is suggested that different identities and behaviours are evident in different settings. Easton and Araujo (1992, p. 83) claim that an actor’s behaviour in one network is influenced by their membership of other networks. Booz (2000) found that individuals representing their organisation in external interactions appear to have a high value-based orientation to their role. They have a high tolerance for ambiguity and attempt to influence relationships by using appropriate compliance-gaining tactics that will achieve their organisational goals. The use of compliance-gaining tactics indicates high-level interpersonal skills. Booz (2000) described these actors as ‘boundary spanners’, who consider reputation paramount to survival and remain cognisant of it at all times. This literature suggests there are sets of skills required to work effectively across organisations, and that behaviour will change from one setting to another.

Therefore individuals and groups are better able to operate in a complex society if they have access to networks that incorporate people with different backgrounds and experiences from themselves and which require limited commitment to the group (Granovetter, 1973; Ashman et al., 1998; Walzer, 1996). Walzer (1996) suggests that networks are most effective when they are diverse, flexible, horizontal and vertical. On the other hand, where there is trust and strong ties, the likelihood of information
transfer and knowledge being rich, ‘sticky’ (or tacit) is increased (Pololny and Page, 1998, p. 6 of 23). Such a list of characteristics is helpful, but does not give recognition to the specifics of how trust is developed, or how rich knowledge transfer is achieved, for example.

In summary, diversity is a way of explaining difference; difference often leads to tension and perhaps conflict. Therefore, some authors suggest it is necessary to find an optimum level of diversity and that diversity is a resource for learning and growth. In the networking and regional/institutional literature experiencing difference is viewed positively as it builds skills required for collaboration. People working across organisations are considered to be ‘boundary spanners’. Participation in diverse networks’ provides access to a variety of knowledge, resources and perspectives not otherwise available.

2.4.2 Coordination and Decision Making
Coordination is necessary for decision making in collaborative arrangements. O’Neil Chung and Brown (1997, p. 414) define coordination as properly sequenced behaviour and the exchange of useful information, stating that the more coordinated a group or team is, the better the decision-making processes and vice versa. For example, in a study of flight crew teams, Guzzo and Dickson (1996) found that effective coordination is in large part a function of effective communication such as providing information before it is needed and asking for input. Processes of coordination assist organisational learning as they help organise knowledge and routines (Dodgson, 1993, p. 377). The need for sequencing and exchange of information to make decisions is an inherent part of decision making. Sequencing assumes planning processes and the setting of goals which assist coordination and decision making.
Table 2.5: Coordination and decision making – contributions and problematic

<table>
<thead>
<tr>
<th>Contributions to this thesis</th>
<th>Problematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination involves sequencing and planning (O’Neil et al., 1997) and provides opportunities for information flow (Dodgson, 1993)</td>
<td>Social, political and economic contextual influences on coordination are generally not considered</td>
</tr>
<tr>
<td>Rules and interests (Lorenz, 1989) outside the collaborative activity itself, influence collaborative activity and its relations with others</td>
<td>Analysis is limited to a moment by moment analysis</td>
</tr>
<tr>
<td>Control and decision making is distributed in knotworking (a form of collaborative activity) where actors need to quickly establish knowledge of each institution’s practices and trajectories (Engeström, Engeström &amp; Vahaaho, 1999)</td>
<td></td>
</tr>
<tr>
<td>Focus on the object or motive when studying inter-institutional interactions (Engeström, Engeström &amp; Vahaaho, 1999)</td>
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<tr>
<td>Coordination mechanisms are reflected in organisational boundaries (Hernes, 2004)</td>
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</table>

Guzzo defines decision making as:

a bundle of interconnected activities that include the gathering, interpreting, and exchanging of information; creating and identifying alternative course of action; choosing among alternatives by integrating the often-different perspectives and opinions of team members; and implementing a choice and monitoring its consequences (Guzzo, 1995, p. 4)

These processes of interpreting and exchanging information are discussed further in sub-section 2.3.3, information flow and knowledge creation.

The networking literature adds to the team literature the idea that the development of procedures or tacit codes of conduct are necessary to deliver consistency of decision making (Keeble et al., 1998) and reinforces the importance of coordination routines and common decision-making practices (Camagni, 1991). For example, in a study of British and French engineering firms, Lorenz (1989, p. 123) found that cooperative arrangements between the firms and the ‘wider society’ resulted in a set of common rules which regulate competition. Owen and Bound (2001) suggest that networks of common interest provide justification for developing coordination routines.

Where there are diverse decision styles Smith et al. (1994) conclude more formal rules of communication and processes are required for coordination. These formal processes require time to monitor, leaving less time for leadership on the part of the
Chief Executive Officer. Formality also requires that all group members spend more time on group maintenance in the form of standardisation of information and processes (Smith et al., 1994) leaving less time for creativity and innovation. The increased formality appears to have a negative effect on team integration and responsiveness.

From an activity theoretical perspective, Engeström et al. (1999) argue that coordination is more than networks of common interest in collaborative activity. They argue that it involves multiple subjects from different institutions or activity systems; that collaboration meets a need or motive; and that subjects or individuals from different activity systems come together to coordinate care across different institutions within the Finnish health system. Engeström et al. (1999) term these brief encounters ‘knotworking’. These authors of the Finnish study analyse collaborative activity between a general practitioner from a health centre, a hospital psychiatrist, a mental health patient and her custodian, police and ambulance officers, all from different Finnish institutions. Each of the subjects was involved in a number of interactions over different periods of time, responding to different motives to meet different needs of their own institution or system of activity and to meet the needs of a mental health patient. Action is coordinated and control distributed during the time these subjects are together. Decisions need to be made quickly, so each subject needs to rapidly establish each other subject’s possibilities and limitations and apply knowledge of the institutional rules, procedures and mores which govern each subject’s actions and decisions. Knotworking adds to coordination and decision making in collaborative activity, an appreciation of the need to quickly establish knowledge of each institution and their practices if a need is to be met. In addition, other observations important for this thesis are that participants from different institutions had different motives to meet different needs. However, the example given in Engeström et al. (1999) differs from the focus of this thesis in that all the institutions involved were public institutions. Although operating in different spheres, these institutions, unlike those in this thesis, had in common the values and language of public servants delivering a public service.
However, these authors identify a key tool to use when studying inter-institutional interactions where there are no established rules, namely to focus on the object (Engeström et al., 1999, p. 352) (or as Leontyev (1977) terms it, the motive) and work with discourse data and conversational analysis. In addition, they emphasise that the ‘internal dynamics and tensions’ of each participating activity system or institution need to be analysed (Engeström et al., 1999, p. 354). The problematic of knotworking is that the analysis is moment by moment in time is appropriate for this type of interaction but raises the question, what is the cumulative effect of multiple interactions with different actors?

Hernes (2004, p. 10) suggests that mechanisms of organisational coordination are reflected in the boundaries of the organisation which are constantly being created, moved or consolidated. The suggestion that coordination mechanisms are reflected in organisational boundaries is important to this thesis and is explored further in later chapters.

In summary, coordination is sequenced behaviour, requiring the exchange of information, which is important for decision making. Formal routines for coordination can impact negatively on interaction in a group. In networks coordination processes are in tacit codes of conduct rather than formal routines. Control and decision making in knotworking, a form of collaborative activity, is distributed assisting subjects to quickly assess possibilities and constraints. Coordination mechanisms are reflected in organisational boundaries and will thus influence collaborative activity. A tool for analysing collaborative activity from the activity theoretical literature is that of following the object or motive of the activity.

2.4.3 INFORMATION FLOW AND KNOWLEDGE CREATION

The previous section identified that coordination was critical to enable information exchange and sharing. Coordination is just one aspect of information flow and knowledge creation. Guzzo, for example, notes that in teams, information is distributed unequally among members, that the integration of information may be
complicated by uncertainty, the effects of status and the failure of a member to appreciate the significance of the information they hold (Guzzo, 1995, p. 5). How do those taking part in collaborative activity determine what information is important collectively? In writing about networking, Simonin (1999) suggests that the goals and purpose of each of those taking part influence what is perceived as important to pass on. Ignorance and lack of collaborative experience are often blamed as the main source of alliance problems and failures:

In a significant way this collaborative know-how affects the ability of firms to understand and adopt proper procedures for information gathering, interpretation and diffusion. Alliances are formed for different reasons. The extent of knowledge transfer is closely linked to the goals of each partner (Simonin, 1999, p. 603).

Thus this suggests that experience, skills and collaborative capability are also part of the mix that influences how well coordination and knowledge flow are done.

Table 2.6: Information flow and knowledge creation – contributions and problematic

<table>
<thead>
<tr>
<th>Contributions to this thesis</th>
<th>Problematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information is distributed asymmetrically (Guzzo, 1995)</td>
<td>The influence of context is largely ignored</td>
</tr>
<tr>
<td>Interpretation and making meaning are part of the exchange of information (Dixon, 1992)</td>
<td></td>
</tr>
<tr>
<td>Knowledge is dynamic, mediates activity and is itself mediated (Blackler, 1995)</td>
<td></td>
</tr>
<tr>
<td>Culture, structure and purpose influence what information is valued (Schein, 1997), how it is interpreted and who it is diffused to (Simonin, 1999; Huzzard, 2004)</td>
<td></td>
</tr>
<tr>
<td>‘Institutional thickness’ in a region (Amin &amp; Thrift, 1994) aids information flow and knowledge creation</td>
<td>Does not explain how institutional thickness aids information flow and knowledge creation</td>
</tr>
<tr>
<td>Universities in regions are important in facilitating knowledge creation (Keeble et al., 1998)</td>
<td></td>
</tr>
<tr>
<td>The mode of production, including labour market arrangements can aid knowledge transfer (Keeble et al., 1998)</td>
<td>Explained across the region, but not how mode of production influences specific activities</td>
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</tbody>
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Meaning and interpretation given to information influence what information is passed on, how it is passed on, and what knowledge may be created as a result. Drawing on the work of Weick, Huzzard (2004, p. 356) states that sense-making is constructed according to values, principles and understanding of the situation. What ‘sense’ is made of the information is then disseminated to others through the creation of a
discourse of power, control and decision making being a normal practice of leaders. Discourses of power and control in relation to information flow and knowledge creation will inform the interaction of subjects and shape the goals of the collaborative activity.

Blackler (1995) posits that knowledge is dynamic, always undergoing construction and transformation in use. It is mediated and mediates in a myriad of ways. Knowledge has status and privilege, it is ambiguous, it involves the ability to use it in particular symbolic and value environments and it is used to decipher the codes of different cultures (Alvesson, 1993, pp. 1001–1002). These socio-cultural perspectives note the role of knowledge in creating social and community identity and a shared language (Alvesson, 1993, p. 1011).

Information flow and knowledge creation within regions are assisted by the number of institutions and organisations and the supportive interlocking web they form, termed by Amin and Thrift (1994, p. 21) as ‘institutional thickness’. ‘Institutional thickness’ is an interlocking web of supportive organisations and institutions ‘including firms, financial institutions, local chambers of commerce, training agencies, innovation centres, clerical bodies, unions, government agencies providing premises, land and infrastructure, business service organisations, marketing boards and so on’ with considerable synergies of interaction, collective representation and common purpose. For example, advice and information from local government, business support agencies, including chambers of commerce and training agencies, was rated as significant or of great value and involved assistance with training, new start-ups and assistance for first-time entrepreneurs. This ‘interactional infrastructure’ (Kilpatrick and Bound, 2005) is important for the development of collaborative experience and capability, and influences not only the development of the industry and region, but the institutions within the industry and region.

Other means of diffusing knowledge and establishing linkages in regions are through informal mixing of entrepreneurs and professionals encouraged by local business associations, clubs, the local university and other technology transfer agencies such as
the Oxford Trust (Keeble et al., 1998, p. 16). The Oxford Trust is made up of a multitude of partners ranging from the local council, the universities, museums, firms, science parks, community education organisations and media organisations with the foundation members being the VenturefestOxford.net and ventruefest.com. It plays an important role in disseminating and diffusing information, knowledge exchange and opportunities throughout the region. Activities include festivals, education programs, businesses events and school education programs. Such activities support formal and informal information flow and knowledge creation, contributing important resources in the form of experience, knowledge of each other, access to each other and interactions where a common language may develop.

In a study of 100 high-technology small and medium firms in the Oxford and Cambridge regions of southern England, Keeble et al. (1998, p. 8) found that the university in each region played an important role in developing and facilitating innovation and cross-fertilisation of research within and between local firms. The universities used strategies such as direct research collaboration, researcher recruitment, dissemination strategies and debate to develop a ‘culture of research collaboration’. These strategies were driven by a culture of research excellence and liberal ground rules rather than formal regulation and institutional devices. Larger local firms also played a role in the development of regional cultures of trust and collaborative research leading to the generation of other firms and continuing research links, trust and collaborative activity. These factors are important for diffusion within regional milieux.

Movement of personnel between firms is significant in its contribution to local networking (Keeble et al., 1998, p. 20) and information flow as personnel take with them their learning as they move from one employer to the next. Movement between firms is encouraged by the ‘mushrooming’ of new firms (Keeble et al., 1998, p. 10), a range of collaborative arrangements between firms and recognition of the importance of skills and technical capability for innovative firms (Kitson and Michie, 1998, p. 5).
This movement of people, and therefore their learning and their networks, is significant in the regions of Oxford and Cambridge. Keeble et al. (1998, p. 18) found that most recruitment was from universities and local firms. Other sources of recruitment came from national and international sources. Most firms (60%) recruited successfully from within the region despite the fact that these highly paid staff tend to be mobile workers operating on a national and international scale.

The organisation of the mode of production in the innovative regions of Oxford and Cambridge relies on a range of strategies including the generation of new firms (and therefore new employment in the region), the presence of research-based firms and large government-owned research laboratories, sub-contracting, share-holding or joint venturing arrangements (Keeble et al., 1998, p. 10). In all, 46% of individuals from the surveyed firms left that firm to set up their own firm within the region; 70% of these retained formal or informal links with their ‘parent’ or ‘incubating’ company. Linkages took the form of interactions from continuing personal contact, swapping of ideas and helpful comments to more formal sub-contracting, share-holding or joint venturing arrangements. There is high intensity of diffusion of embodied technological and research expertise via entrepreneurial spin-offs, reflecting trust and contributing to a regional collective learning capability (Keeble et al., 1998, p. 11).

The concept of regional collective learning focuses on the argument that regional clusters of small and medium sized enterprises can, given favourable conditions and sufficient historical evolution, develop a capacity for self-sustaining technological learning, innovation and the generation of new products, services and enterprises. The development of a regional capacity for collective learning involves both the establishment of pre-conditions for learning, in the form of culturally-based rules of behaviour, engagement and collaboration and accepted but tacit codes of conduct between individuals and firms which enable the development of trust, and active regional processes of inter-firm networking, interaction and exchange of expertise (Amin and Thrift, 1994, p. 24).

The distinct social structural patterns in exchange relations within markets shape the flow of information (Gulati, 1999, p. 398). Context, in the form of the mode of production, including labour market arrangements, the infrastructure within a region and interactions between these institutions and the structure of markets, all influence the flow of information and knowledge creation.
In summary, information flow and knowledge creation are important facets of collaborative activity, influenced amongst other things by the distribution of power and the goals of each organisation taking part. Knowledge creation is a dynamic process of interpretation, a discourse, a tool of power and control. Information is often distributed asymmetrically. Factors that assist information flow and knowledge creation in a region include the number of institutions and the extent of interaction between them. Universities are important institutions in the process of information flow and knowledge creation in a region, as is the movement of personnel, an aspect of the mode of production in the region and industry.

2.4.4 Common or Shared Understandings

Common or shared understandings can include shared mental models (a person’s conception of a system), common language and concepts, common problem-posing and problem-solving heuristics, a group’s culture in which there are commonly told stories and myths, commonly held values, beliefs and goals.

The organisational learning literature makes multiple references to sharing, for example, ‘shared understanding’ (Louis, 1986), ‘shared mental models’ (Nonaka and Takeuchi, 1995) and developing a collective ‘image of the larger system’ (Louis, 1986). Communities of practice and activity theorists explore some of the tensions and difficulties in developing a common or shared understanding. In regional milieux characteristics of collective learning include the development of a ‘common language’ (Keeble et al., 1998, p. 2), decision-making processes, problem posing, common problem-solving heuristics (Camagni, 1991, p. 124) and sharing of research findings (Maskell and Malmberg, 1999; Keeble et al., 1998).
Table 2.7: Shared understandings – contributions and problematic

<table>
<thead>
<tr>
<th>Contributions to this thesis</th>
<th>Problematic</th>
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<tbody>
<tr>
<td>Commonly held image (Argyris &amp; Schon, 1978) contributes to the making of constant adjustments</td>
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<tr>
<td>to achieve a sense of mutuality and to recognise meaning in each other’s histories and practices</td>
<td></td>
</tr>
<tr>
<td>Control is anchored in formal systems and personal relationships (Coopey, 1995)</td>
<td></td>
</tr>
<tr>
<td>Sharing stories (Brown et al., 1991) questioning, challenging seeking clarification and actively seeking alternative perspectives (Owen, 2001) are strategies for developing shared mental models</td>
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Developing a common or shared understanding is fraught with tensions and contradictions not well acknowledged in the networking and regional/institutional literature, except to note that coordination and planning are linked to the development of shared language and mental models (Camagni, 1991, p. 124; Osar et al., 1999, pp. 445–446). However, literature that explores organisational learning from a number of different perspectives does explore these tensions to some degree.

Organisational culture, for example, can be understood from different perspectives ranging from culture as shared values and stories (Louis, 1986; Owen, 1999) to culture as a tool of control (O’Reilly and Chatman, 1996). Manifestations of culture are evident in a group’s specialised language and symbols; collectively held values and beliefs; myths, stories and legends; and the history of experiences (Owen, 1999, p. 46). There are generally multiple cultures within an organisation described by Louis as ‘culture bearing milieus’, which are:

- regularly convening settings, they impose structural interdependencies among people performing tasks, they provide opportunities for affiliation, and they constitute constellations of interest or purposes. As such they serve as breeding grounds...for the emergence of locally shared understandings (Louis, 1986, p. 79).

Whether culture is constructed as a tool of control and/or as shared stories, beliefs and values, culture is a filtering mechanism for constellations of shared interests or purposes. To identify a cultural group therefore is to identify a set of shared understandings. But, how are these shared understandings, collectively held values and beliefs, developed, and to what extent are they shared?
Because of the heterogeneity of group membership, cultures can consist of shared, partly shared and/or contested values, beliefs and norms (Caulkins, 1991). O’Reilly and Chatman (1996, p. 160) explain that understanding culture is to realise that culture is a social control system based on shared norms and values that set expectations about appropriate behaviour and attitudes for members of the group. However, control is not automatic; but is constantly contested as different interests compete. Coopey (1995, p. 197) claims that ‘actors within an organisational setting are involved in a “dialectic of control”, attempting to maintain some semblance of control over their work lives’. Social control is anchored in both a formal system such as rules, procedures and organisational hierarchies, and in personal relationships (Coopey, 1995, p. 164).

Argyris and Schon suggest collective purpose is achieved through the organisation requiring individuals to develop an image of the whole:

> Each individual must generate an image of the cooperative system on which his or her own performance depends … Intelligent action depends on a continuing mutual adjustment of individual behaviors, one to the other. Their organising depends on each person’s image of the larger system (Argyris and Schon, 1978, p. 117).

The alignment of individual behaviours to a commonly held image requires a sense of mutuality and working through differences.

In a study of technical support representatives within an organisation Brown et al. illustrate a community of practice at work. Representatives shared stories of past machine breakdowns, using narrative to solve problems, which in turn became part of the learning of this community through a process of enculturation:

> Learning is a process of enculturation…the activities of a domain are framed by its culture. Their meaning and purpose are socially constructed through negotiations among present and past members (Brown et al., 1991, p. 34).

Joint enterprise, shared knowledge and development of trust and ignorance, competition and cooperation, trust and suspicion, power and dependence (Wenger, 1998) are all features of communities of practice as they work towards common understandings, values and practices. These understandings of learning relate to structures where there are established practices, unlike collaboration between institutions where participants may constantly change. However, like the communities
of practice literature suggests, there is a complex interaction of opposites taking place. This can result in differences in perception and expectations (Skinner, Saunders and Beresford, 2004). Owen (2001) suggests strategies that assist the development of shared mental models include:

behaviours such as: asking relevant and thought-provoking questions, sharing observations, seeking alternative perspectives, assertively challenging a particular opinion, seeking clarification and sharing information through processes of consulting and collaborating (p. 598).

The range of skills required to develop shared understanding is considerable.

What is common across these different literatures is that collaboration and learning involve shared purposes. For example, firms work together in order to meet their need to be innovative, competitive (Kitson and Michie, 1998), and therefore profitable. Through collaboration, firms reduce uncertainties (Lorenz, 1989), increase opportunities for internationalisation (Keeble et al., 1998; Kitson and Michie, 1998) expand their range of expertise, and develop specialist products, achieving a range of corporate objectives. Skills and processes for achieving shared understanding and developing shared mental models includes sharing stories, questioning, seeking alternative perspectives, clarifying and challenging. It is a process that necessarily involves tension.

2.4.5 Trust and Support

Whatever the setting – a team, an organisation, interfirm networks, regional/institutional learning – support and trust, multiple exchanges, through coordination, and sharing of information, posing and solving problems and creating knowledge together, develop over time. In the team literature this is construed as feedback and supportive interpersonal behaviours; in the organisational learning literature as empathy and openness; and in the networking and regional/institutional literature as trust and reciprocity evidenced in the exchange and flow of rich ‘sticky’ information. For example, Donnellon (1996, p. 11) concludes tension is integral to team work and organisations. There is tension within teams, within individuals and within organisations as teams try to make sense of team work. Team dynamics are
shaped by the situated context in which the team works; the development of trust is dependent on the structure and culture (Donnellon, 1996, p. 27) of the organisation.

Table 2.8: Trust and support – contributions and problematic

<table>
<thead>
<tr>
<th>Contributions to this thesis</th>
<th>Problematic</th>
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<tr>
<td>Reciprocity is evidence of trust and is dependent on the beliefs of actors in the networks</td>
<td>The development of trust is perceived as unproblematic</td>
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<td>(Lorenz, 1992)</td>
<td></td>
</tr>
<tr>
<td>Trust assists good information flow, open dialogue, facilitating collaboration and innovation</td>
<td>Historical processes influence possibilities for developing trust (Maskell</td>
</tr>
<tr>
<td>(Fleck, 1996; Quevit, 1991) and quick decision making (Laere &amp; Heene, 2003)</td>
<td>&amp; Malmberg, 1999)</td>
</tr>
<tr>
<td></td>
<td>The question remains of how to develop trust where common backgrounds are</td>
</tr>
<tr>
<td></td>
<td>not present,</td>
</tr>
<tr>
<td>Historical processes influence possibilities for developing trust (Maskell &amp; Malmberg, 1999)</td>
<td></td>
</tr>
<tr>
<td>Common backgrounds assist the development of trust (Camagni, 1991) yet tension is integral</td>
<td></td>
</tr>
<tr>
<td>to the development of trust (Donnellon, 1996)</td>
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An assumption in the organisational learning literature is that trust and support are the outcome of individual traits, rather than a complex mix of factors. For example, in generative learning organisations managers are more likely to be viewed as trustworthy when they demonstrate consistency, integrity and share information and control (DeSimone et al., 2002, p. 385).

In discussing trust within industrial districts, Lorenz (1992) suggests that the beliefs of those involved are important. He argues that although norms of reciprocity may develop and are evident within many industrial districts, the maintenance of reciprocity is dependent on the beliefs of actors. In particular, the belief that entrepreneurship should be rewarded by social advancement, that is, there is a gain to be made for the actor (Lorenz, 1992, p. 200). Over time common bonds and social identities are shared and there is a developing trust and an exchange of reciprocal services (Tallman and Atchinson, 1996). Trust, good information flow and open dialogue, formal or informal, facilitate collaboration and potentially innovative outcomes (Fleck, 1996; Quevit, 1991; Camagni, 1991). Trust is important in enabling members of a network to make quick decisions and process more complex
information (Laere and Heene, 2003, p. 253). The development of trust and a common cultural, psychological and political background can be enhanced by a local institutional agent (Camagni, 1991). Historical processes also mould possibilities. Over time, institutional endowment changes, but:

at each point in time it has a directional effect on the efforts of firms in the region by supporting and assisting some types of knowledge creation while hampering or preventing others (Maskell and Malmberg, 1999, p. 174).

Maskell and Malmberg (1999) suggest that contextual factors such as historical processes influence what is considered favourable and what is not considered to be favourable, thus enhancing or constraining what is possible. This is important in this thesis, and will be discussed in detail in Chapter Six.

In the social capital literature trust is typically described as the lubricant for diverse groups to work together (Flora, 1998, p. 11; Putnam, 1993). When flow of information is not channelled exclusively to a particular group, but is dispersed widely throughout the community, decisions are more likely to be accepted. Putnam argues that accurate information and reliable enforcement (1993, p. 164) are necessary for cooperation, that is, actors trust each other to offer exchanges of information. Actors need to trust each other to offer exchanges of information, to develop norms of reciprocity and an ability to listen to different perspectives in order to participate effectively (Putnam, 1993, p. 164). Trust is generally treated as unproblematic. For example, how is enforcement effectively developed, given that gain for the actor is part of reciprocity?

O’Reilly and Chatman, (1996) suggest that trust is perhaps not so unproblematic, that power, control and influence are part of the dynamic of building trust and support in relationships between firms. If power is asymmetrically distributed then the relationship will be difficult to manage and the benefits for the junior partner less easy to realise. Weakly bonded partnerships are likely to be volatile, whereas strong bonds are able to withstand some kinds of force or challenge. In the interfirm literature as in the communities of practice literature, autonomy and dependence, trust and control are combined within a cooperative yet competitive environment (Sydow and Windeler, 1998, p. 267).
Trust is perceived in much of the literature discussed above as unproblematic. Where there is recognition given to tensions and conflict inherent in much collaborative activity, there appear to be limited processes identified in this literature for ways of developing trust, which is important in information flow and decision making. Trust is considered as that which is between individuals, without then taking the next step and conceiving of trust as a collective effort. The potential to develop trust is influenced by historical precedent and the asymmetrical distribution of power and influence.

2.5 CONCLUSION

Collaborative activity involves working across different practices and histories; it is a process of working at the boundary which is a site of tension and potential learning. Shared understanding in this site is achieved through the development of boundary tools through which dialogue, story-telling, knowledge construction, argumentation and differentiation take place. The collective learning literature, drawn from the literatures on teams, organisational learning, interfirm networking, regional and institutional learning, identifies learning a little differently. The analysis of this literature highlighted the features of diversity, coordination and decision making, information flow and knowledge construction, common or shared understandings, and trust and support.

Experience in diverse collaborative activity increases skills of collaboration, the diversity of networks, access to resources and perspectives not otherwise available. Coordination and decision making requires good communication skills, and the interpreting and exchange of information. These processes are assisted by trust and informal arrangements for exchange. Interpretation of information is influenced by the goals of each participant or organisation taking part in the collaboration, and by the asymmetrical distribution of power. A rich presence of a range of institutions and support organisations, including universities, are important in assisting the flow of information within a region, as are informal opportunities to meet the movement of personnel between organisations. This latter suggests that aspects of context, such as
the mode of production, mediate the flow of information. Information exchange is core to the development of shared understandings and the development of mental models, just as shared purpose is intrinsic to collective activity. These in turn require trust and support.

Collaborative activity is mediated by tools, signs and symbols which themselves mediate the situated context of activity and activity beyond organisational boundaries. Activity is mediated by economic, political, and societal values and beliefs, all aspects of context. Learning and activity cannot be separated.

In much of the team, organisational, networking, regional and institutional literatures, context is, as Seddon (1994) notes, either ignored or tacked on. It is not intrinsic to the analysis of the phenomena under study. Socio-cultural theorists consider situated context as mediating activity. Cultural historical activity theorists extend this notion by not only using activity as the unit of analysis, but by recognising the tensions and contradictions inherent in activity, and that activity is mediated by the cultural, historical and institutional contexts in which it takes place.

Methodologies for studying collaborative activity, context and learning require more than a focus on any one of these phenomena; a methodology that integrates collaborative activity, context and learning is required. Activity theorist Engeström (2004) notes that following the object of interacting institutions is a tool that focuses on the activity being studied. An activity theoretical perspective strongly informs the methodology employed in this thesis and is discussed in the following chapter.
CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The literature reviewed in the previous chapter suggested that it is important to understand learning and context as dynamic and interactional. The interaction between learning, contextual conditions and institutional collaboration, the focus of this study, is an area of study which is under-theorised. Thus a qualitative, theory-building methodology is employed in this study.

Theory construction in social research is always undertaken against a background of more general underlying assumptions (Layder, 1994, p. 15), or ideological beliefs. A dialectical materialist view of the world is intrinsic to the arguments made in this thesis. A dialectical materialist view of the world is a philosophical stance that claims
we are active in creating our futures; we make our own history and act and interact with others in the conditions we have inherited. As social beings, development of our consciousness is influenced by family, the social, political, environment and economic realities; and thus consciousness shapes our agency. In the course of their own individual and collective development human beings ‘actively shape the very forces that are active in shaping them’ (Daniels, 2004, p. 121). Such beliefs inform the unit of analysis, which in this thesis is activity. Activity as the unit of analysis does not separate out phenomena as isolated from its setting or context, rather the social relations of activity are studied. Activity is always determined by need which has social and historical origins and is identified with the features and relations of objects (Davydov, 1990, pp.129–130), as indicated in the explanation of Activity Theory in Chapter One. Such an epistemology excludes methodologies which separate out learning or context or collaboration from each other.

Activity theory is used both as a theory of practice (e.g. Blackler, Crump & McDonald, 1999) and as an analytical framework (e.g. Daniels & Cole, 2002; Middleton, 1996; Engeström, 1999). Engeström (1996) makes specific comment on the use of activity theory to analyse and interpret data in the following quote.

How can one analyse and interpret data that record and describe human behaviour and discourse? From an activity theoretical viewpoint, three basic principles should be observed. First a collective activity system can be taken as the unit of analysis, giving context and meaning to seemingly random events. Second, the activity system and its components can be understood historically. Third, inner contradictions of the activity system can be analysed as the course of disruption, innovation, change, and development of that system, including its individual participants. (p.65)

Engeström notes principles of activity theory for use in analysis of data, but also the need for such data to record and describe human behaviour. For this reason, a framework drawing on the activity theoretical approach has been employed to focus on the tensions and contradictions of collaborative activity, the evolution of the collaborative activity and to focus on uncovering the ways in which context gives meaning. To understand the historical components of the collaborative activity investigated in this case study, interview questions were designed to uncover the components of each activity system, their interactions and their social relations. Observational data of collaborative activity in practice was also gathered to assist with validating respondent’s perceptions gathered through interview data. Finally in the
analysis of the data, tensions and contradictions were identified and further analysed employing an activity theoretical approach in the initial analysis. Thus, activity theory in this thesis has been used primarily as an analytical framework.

To identify what methodologies and methods will be employed in a research design Crotty (1998) states there are four elements. These elements are:

- **Epistemology**: the theory of knowledge embedded in the theoretical perspective and thereby in the methodology,
- **Theoretical perspective**: the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria.
- **Methodology**: the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes,
- **Methods**: the techniques or procedures used to gather and analyse data related to some research question or hypothesis (Crotty, 1998, p. 3).

The introduction to this chapter, along with the explanation of Activity Theory in Chapter One, addresses the first two elements of epistemology and theoretical perspective. The remainder of this chapter is devoted to setting out the methodology and methods used in this study. The methodology is introduced by the criteria used to judge the rigour and trustworthiness of the data and analytical processes used in this study.

### 3.2 Judging the Research Process

Denzin and Lincoln (1998, p. 10) state that a standard feature of qualitative research is that it requires multiple sources of data and multiple types of data as ‘rich descriptions of the social world’. To this end the establishment of validity, reliability and generalisability differs from quantitative research:

Qualitative research is inherently multi-method in focus. However, the use of multiple methods, or triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question. Objective reality can never be captured. Triangulation is not a tool or a strategy of validation, but an alternative to validation. The combination of multiple methods, empirical materials, perspectives and observers in a single study is best understood then, as a strategy that adds rigor, breadth and depth to any investigation (Denzin and Lincoln, 1994, p. 2).

Qualitative research is about capturing the lived experience, and about making meaning. The terminology validity, reliability and generalisability is from the
positivist paradigm and increasingly qualitative researchers are questioning and rejecting this language and developing alternative language and processes more appropriate for measuring the qualitative research process (see e.g. Janesick, 2000; Lincoln and Guba, 2000; Denzin and Lincoln, 2000). Validity, reliability and generalisability are the means by which positivist researchers judge the rigour of their research. Rather than employ the trinity of validity, reliability and generalisability qualitative researchers such as Denzin and Lincoln (2000, p. 158) use terms such as trustworthiness and authenticity rather than, for example, internal and external validity. This approach is employed in the following section to identify ways of judging the rigour of the research methodology and methods employed in this thesis.

3.2.1 Developing Criteria for Judging the Research Process

The criteria used to ensure the veracity and rigour of this study are summarised in Table 3.1 followed by an explanation of how they were selected and applied.

Miles and Huberman (1984, p. 22) note that conclusions drawn from the data need to be ‘verified’. This process, they explain, may be as minimal as revisiting field notes, to check thoughts and conclusions or it may be as thorough as argumentative dialogue amongst colleagues to develop ‘intersubjective consensus’. In other words, the meanings arrived at by the researcher from the data have to be tested for their plausibility and sturdiness. Janesick (2000) describes a similar process reminding us that the qualitative paradigm has to do with description and explanation and whether or not the explanation fits the description, in other words given that there are multiple possible interpretations is the explanation credible?

Staying in a setting over time provides the opportunity to study various facets, components and perspectives to deepen understanding of what is taking place:

This allows for multiple ways of framing the problem, selecting research strategies, and extending discourses across several fields of study (Janesick, 2000, p. 395).
Lincoln and Guba (2000, p. 180) suggest a number of authenticity criteria, which they claim are the ‘hallmarks of authentic, trustworthy, rigorous, or “valid” constructivist or phenomenological inquiry’. These are:

- **Fairness**: fairness refers to balance, that is, views and voices of all stakeholders are gathered
- **Ontological and educative authenticity**: increasing awareness among participants of their capacity to engage in critique, particularly moral critique
- **Catalytic and tactical authenticity**: the ability of the research to prompt positive social change

In this study, the latter two are less applicable as the study is not one where the researcher is actively involved with the subjects of the study. The process of change is more likely to come after the completion of the research and therefore it is not possible to track this for the purpose of this thesis, rather it will form the topic of further work.

In qualitative research it is necessary to gather thick descriptions, to state intentions, the ‘meanings mobilized in the process of their construction’ and ‘the story must be told in relation to its contextual dynamics and other texts’ (Kincheloe and McLaren, 2000, p. 286). Analysis is a back-and-forth process of studying the parts in relation to the whole and the whole in relation to the parts, combined with movement between abstract and concrete (Kincheloe and McLaren, 2000, p. 286).

Table 3.1 sets out a summary of the processes and criteria used to measure the rigour of the research process in this study, and the ways in which these were met.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>How addressed in this thesis</th>
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| Declare your beliefs about truth and knowledge (Lincoln & Guba, 2000; Creswell, 1998) | Set out in Chapter One and Appendix One  
|                                                               | See also Appendix One for the background and experience of the researcher.                  |
| Member checks and audit trails (Janesick, 2000)               | The use of follow-up emails and phone calls to check and clarify data and where necessary gather more data on specifics was undertaken with all interviews in stages two and three. |
| Fairness: collecting the voices of all stakeholders (Lincoln & Guba, 2000) | All information technology Tasmanian institutions were interviewed along with a number of members and office bearers from within each |
Institution. All interviews were tape recorded and fully transcribed.

Most interviews were over one hour in length, with highly literate subjects who are willing to tell stories of experiences. This was added to by observation and documentation. Common themes were identified and checked across interview data, documents and observation notes.

Data was gathered over a period of three to four years.

Data was coded and entered into the computer software program NUD*IST. Stage three of the research process moves back out into the field to authenticate the conceptual framework developed from data collected in the previous stage. Analysis of themes was checked across all interviews, documents and observation notes.

The multi-disciplinary nature of this research provided multiple facets from which to gather data and to interpret data.

The following section sets out the methodology and methods used in this study.

3.3 Methodology

This section describes the case study methodology and the selection of the case. This is followed by stages of data collection, what data was collected and how it was collected.

3.3.1 The Case Study

Insights into how things get to be the way they are result from case studies, with the discovery of new relationships, concepts and understanding (Merriam, 1988, pp. 10–14). The instrumental case study of collaboration between Tasmanian information technology institutions, in this thesis, provides insights about the relations between contextual conditions, collaboration and learning. As an instrumental case study, the case is of secondary interest, playing a supportive role to facilitate our understanding of something else (Stake, 2000, pp. 447–449).
3.3.1.1 Selection of the Case

As discussed in Chapter One, institutions have a major role in creating environments for successful change – politically, socially and economically – and are strategically placed to inform and implement policy. Institutions are ideal subjects for the study of collaborative activity, contextual conditions and learning as they influence and are influenced by the form and structure of society in readily identifiable ways.

The Tasmanian information technology industry was purposefully selected as this industry and its institutions had the following features at the time the study was undertaken:

- A sunrise industry where there was a lot of change taking place
- A sunrise industry where change is readily evident
- An industry with a range of institutions

Sunrise industries experience considerable change and development as they pass through the early stages of development. This is explained in Chapter Four. Change is relevant to this study as it is a reflection of learning. Mature industries have well-established practices and values, therefore it is often harder to see change over a short period of time. A sunrise industry has not yet developed histories of practice, and change is more likely to take place over a shorter time period. An industry with a range of institutions provides potentially greater possibilities for collaboration.

The Tasmanian information technology industry is in its early stages of development, the rate of change and development is rapid, and there are a range of institutions in the industry, some of which have already ceased to function or changed name and purpose in the time of the study as shown in Chapter Four. In addition, the information technology industry has the capacity to provide important enabling products and competencies for all other industries providing another layer of change.

As the case study of the Tasmanian information technology industry progressed it became evident that a particular focus of analysis was required in order to explore in more detail the relations between contextual conditions, collaboration and learning. The particular focus of analysis was an industry-initiated Marine Information
Communications and Technology (ICT) Cluster, discussed in Chapters Six, Seven and Eight. The Cluster was an industry driven cluster, a bottom-up process where collaborative activity was initiated and driven by TasIT, the employer institution.

Snowball sampling was used to identify who was involved in the developing Marine ICT Cluster. This data collection took place during the middle months of 2004, so interviews are historical recollections of each respondent’s account of the developing Cluster which was launched in March 2004.

### 3.3.2 Stages of Data Collection

Data collection took place over three stages as set out in Table 3.2. The first stage was a collection of preliminary data, with stages two and three consisting of the core data for this study.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Review of literature on context, collaboration and learning</td>
</tr>
<tr>
<td>1998–2000</td>
<td>Honing of the problem and gaps in the research</td>
</tr>
<tr>
<td></td>
<td>Preliminary data collection</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Continuing literature review and honing of the problem</td>
</tr>
<tr>
<td>2001–2003</td>
<td>Development of the methodology</td>
</tr>
<tr>
<td></td>
<td>Collection of data</td>
</tr>
<tr>
<td></td>
<td>Initial analysis of data</td>
</tr>
<tr>
<td></td>
<td>Development of theoretical framework</td>
</tr>
<tr>
<td></td>
<td>Submission to the Faculty of Education of four chapters to upgrade from Masters to Doctorate</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Continuing literature review and honing of the problem</td>
</tr>
<tr>
<td>2004–2005</td>
<td>Collection of data to authenticate the theoretical framework</td>
</tr>
<tr>
<td></td>
<td>In-depth analysis of all data</td>
</tr>
<tr>
<td></td>
<td>Writing of thesis</td>
</tr>
</tbody>
</table>

#### 3.2.2.1 Stage 1

Stage 1 was undertaken over nearly three years of part-time study. The study began with a focus on industry learning studying the work of Industry Training Advisory
Boards (Industry Training Advisory Boards), the only ongoing formal tripartite structure (unions, employers, government) in Australia at this time. Reflective of the case study of formally networked institutions, the literature reviewed at this stage, was primarily the networking literature. Research questions at stage one were focused primarily on interaction in the tripartite arrangement of employer bodies, unions and government.

Preliminary data (12 interviews) was collected from the Community and Health Services Industry Training Advisory Board and the Tasmanian Building and Construction Industry Training Board. These included interviews of representatives from employer organisations, unions, a government representative and the Executive Officer. This data confirmed the importance of institutions, but the research questions were not formulated. Consequently there was no focus for the data and it had limited value.

3.2.2.2 STAGE 2
A change of supervisor resulted in a change in focus to one that I found more meaningful. I decided that greater understanding of industry learning and the way in which diverse groups work together was to be the focus of the study. Accordingly I decided it was necessary to interview industry bodies in their own right, not as members of an Industry Training Advisory Board whose focus was on Vocational Education and Training (VET) and to look at another industry where change was rapid, readily evident and an industry with a range of institutions – the information technology industry. Note the focus at this stage is on industry bodies, rather than conceiving of them as institutions. Appendix 2 summarises the changing research focus. The focus on diverse groups working together added a greater range of literature to be reviewed, namely the team, group and organisational learning literature.

Activity Theory was employed to inform the data collection and analysis. Stage 2 involved collection and analysis of data, and the development of a conceptual
framework. There were two main purposes of being in the field during Stage 2 in 2002:

- To collect data about each industry body, their work and collaborative experiences
- To collect data about the general experience of collaboration between the industry bodies

In this stage data was collected from respondents of the following institutions:

- TasIT, the employer body
- Australian Computer Society, the professional body
- Department of State Development, the relevant government department
- Intelligent Island, the body established to strategically develop the Tasmanian information technology industry
- Information Technology Industry Training Advisory Board
- Information Technology Industry Council
- Unions Tasmania, the peak union body

Chapter Five provides a detailed account of most of these institutions. Having data about each industry body provided material for identifying any overlapping object of collaborative activity and the object of production and trajectories, material for interpretation relating to boundaries and ‘boundary space’ in which collaborative activity takes place, is discussed in the five findings chapters.

It was during analysis of the data collected in this second stage that I became aware of the importance of context as I began to develop a conceptual framework.

3.2.2.3 STAGE 3

In the third stage the theoretical framework developed in Stage 2 was authenticated and expanded by going back into the field to study a specific example (the evolving Marine ICT Cluster) of what I was now conceiving as collaborative activity between institutions, rather than diverse groups working together. In addition it was during this stage that I further developed my understanding of context as embedded in activity and grappled with the appropriate use of language to write about it. Therefore, data collection is focused on collaboration between institutions and the interrelatedness of activity and what were later in this stage, termed contextual conditions.
Institutional representatives interviewed at this stage were selected because they had been involved in an industry initiated Cluster – the Marine ICT Cluster. During initial discussions to set up an interview with TasIT, I was informed about the Cluster, which I identified as being an example of collaborative activity that would provide relevant data for this study. The Marine ICT Cluster was initiated by private industry, and had government institutions involved with policy and research institutions involved, as well as firms, making it an ideal focus for this study. Data for this stage was collected in 2004 from representatives of the following institutions:

- TasIT
- Department of State Development
- Intelligent Island
- Two research institutions
- Two firms

The analysis of this data allowed me to develop a much deeper understanding of collaborative activity, contextual conditions and learning. This third stage again required a revisiting of the review of literature. Activity theoretical literature on collaboration was reviewed providing a perspective from which to review the networking, team and organisational learning literature. Not only was this consistent with the process of data collection, but also provided some insights into other literatures such as boundary crossing (Fitzpatrick, 2000), communities of practice literature (Wenger, 1978; Lave, 1996) the seminal works informing activity theory such as Ilyenkov (1960; 1982), Leontyev (1977, 1978), Marx (1978), and other activity theorists such as Wertsch (1998) employed in the developing theoretical framework, used in Chapters six, seven, eight and nine. The theoretical framework was modified and the final wording of the research questions settled on. As will be discussed in section 3.4 of this chapter, data was analysed with the aid of NUD*IST, a qualitative data analysis software program. The final writing and editing of the thesis was completed in this stage.
3.3.3 DATA COLLECTION

In this study I used non-participant observation, semi-structured interviews, and the gathering of documentary materials such as policy documents, minutes of meetings, statistical information and reports. Below is a rationale for the use of these strategies and an explanation of how the data was gathered.

Stage 1 is not discussed in detail as this stage was a process of identifying the research topic and the case. Data collected in this stage did not directly contribute to this thesis. This section is set out under the headings of types of data collected – documentary data, interviews and observation – with each of these sub-sections commencing with data collected in Stage 1 or 2 as appropriate followed by data collected in Stage 3.

3.3.3.1 DOCUMENTATION

Documents collected over a period of four years included regular visits to each institution’s web page, bulletins, flyers advertising events and e-bulletins as shown in Table 3.3.

Public information from each institution’s web page was invaluable for gaining a basic understanding of their work, activities and any documents they were producing. After the first interview with TasIT, they kindly included me in their e-bulletins. Other interviews in 2004 also provided another source of information about industry events and documents from the Cluster Steering Committee. As Hammersley and Atkinson (1983) note, documents are data that reflect the producer’s interpretation of the world or context.

To treat them as a resource...is to trade on the interpretative and interactional work that went into their production, to treat as a reflection or document of the world phenomena that are actually produced by it (Hammersley and Atkinson, 1983, p. 147).

Documents can be interpreted from the perspective of who writes them, who reads them, for what purposes, on what occasions, with what outcomes, what is recorded, what is omitted, what is taken for granted (Hammersley and Atkinson, 1983, p. 147). An analysis of documents was used to identify underlying assumptions, identifying what was ‘taken for granted’ (Wodak, 1996; Gee, 1999).
Documents collected in 2004 relating to the Marine ICT Cluster (see Appendix 3) included minutes, the Cluster proposal and a survey of the industry undertaken by the private company, KPMG. Minutes were a valuable source of material for analysing the trajectory of the Cluster Steering Committee and for tracking the shifts in those attending. The Cluster Proposal reflected possibilities and conceptualisation of the Cluster at this point in time by those involved.

3.3.3.2 INTERVIEWS
Denzin and Lincoln (2000, p. 644) describe the interview as a conversation producing ‘situated understandings grounded in specific interactional episodes’. In keeping with the emergent nature of qualitative enquiry (Creswell, 2005, p. 181), interview questions and sites are often emergent, and may change as the researcher learns the best sites about the phenomenon of interest (Creswell, 2005, p. 182). Interviews in this study were conversational, not always following the order of the interview questions, but covering the intent of the questions. In each stage interview questions emerged from the application of Activity Theory as a tool for collecting data, the literature and purpose of being in the field at that stage. Copies of interview questions are included in Appendix 4.

The process of setting up interviews followed the University of Tasmania ethical guidelines as required in the ethics application in Appendix 3. Interviews were set up by initially making telephone contact. At this stage the study, its purpose and the participants’ potential role in the study were explained. This telephone contact was
followed up with a letter of invitation to participate in the research (see Appendix 6) explaining the research and a copy of probable interview questions. Some days later another telephone call was made to set up a time for interview. Before commencing each interview, participants were asked their permission to audiotape record the interview and asked to sign a consent form (Appendix 7) which included an explanation of data storage, protection of confidentiality, the right to withdraw at any time and procedures and contacts to follow if participants felt aggrieved in any way. The consent form also included a clause noting that respondents who hold an official position or title may be identifiable due to their official position.

I decided to use the names of each information technology industry institution in Stage 3 as, even if pseudonyms were used, respondents could potentially still identify the institution, but not necessarily the respondent. It should be noted that where the same institutions were interviewed in Stages 2 and 3 the respondents were different. Participants were highly cognisant of the fact that within the Tasmanian information technology community, despite de-identification procedures, their comments could be readily identifiable, given the small size of the industry. Despite this, they were prepared to take part in the study, although there is little doubt that participants would have provided more in-depth data if this had not been a concern. In a number of instances the tape was turned off for part of the interview.

The details of interviews and observations have been combined in Table 3.4. In Stage 2 the 11 semi-structured interviews of between 50 minutes to two hours were in most instances followed up by four to six turns of email and/or phone discussions as analysis proceeded, seeking clarification or further information on aspects of data. Interviews in Stage 3 (see Table 3.4) were of a similar length and used the same follow-up process.
Table 3.4: Interviews and observations collected over each stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>Institution</th>
<th>Interviews</th>
<th>Other forms of contact and discussion</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Community and Health Services Industry Training</td>
<td>6</td>
<td>Follow-up phone calls</td>
<td>2 observations of meetings</td>
</tr>
<tr>
<td></td>
<td>Advisory Board</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tasmanian Building and Construction Industry Training Board</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 2</td>
<td>Information Technology institutions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intelligent Island</td>
<td>1</td>
<td></td>
<td>4 observations of industry events were undertaken:</td>
</tr>
<tr>
<td></td>
<td>Industry Council</td>
<td>1</td>
<td></td>
<td>- a report back from an international conference</td>
</tr>
<tr>
<td></td>
<td>TasIT</td>
<td>2</td>
<td></td>
<td>- 3 seminars for the industry organised by Intelligent Island and TasIT</td>
</tr>
<tr>
<td></td>
<td>Industry Training Advisory Board</td>
<td>1</td>
<td>Multiple email exchanges and follow-up phone discussions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Peak union body</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Department of State Development</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Australian Computer Society</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Peak State TasIT</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Software cluster</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 3</td>
<td>Marine ICT Cluster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TasIT</td>
<td>1</td>
<td>Multiple email exchanges and follow-up phone discussions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Research Institutions</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intelligent Island</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Department of State Development</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Firms</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Champion</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

During Stage 2 the purpose was to collect data about diverse groups such as industry bodies working together and the influence of context. In this second stage interviews were informed by the use of Activity Theory. A matrix was developed to aid this process, as shown in Table 3.5. Along the horizontal axis are the nodes in an activity system:
- Tools, these include mental models and physical artefacts
- Rules and conventions
- Community, those groups and individuals who share the same object of activity
- Division of labour
- Object of activity

Along the vertical axis are the principles of Activity Theory (Engeström, 1999), namely that:

- The activity system is the unit of analysis
- Voices are multiple presenting different views, histories and traditions which collide and interrelate over time and at any one point in time, producing contradictions
- Historicity shapes the trajectory of each of the nodes and of the system
- Contradictions are a source of change and development
- Expansive transformation is a possibility

Major data collection processes were identified for each cell as shown in Table 3.5.

Stage 3 interviews were formulated following initial interpretation of data collected in Stage 2 during 2002, and used in conjunction with relevant literature to develop a theoretical framework. The purpose of Stage 3 interviews was to authenticate and elaborate this framework. A particular focus of interviews in this stage was the collaborative object and object of production of the developing Marine ICT Cluster, as each institution perceived it. In this third stage a focus of interview questions was to follow the object, applying Engeström’s (2004, p. 18) statement that it is necessary to ‘follow the objects’ over time and space to understand learning in interacting activity systems.
Table 3.5: Framework for initial data collection in Stage 2

<table>
<thead>
<tr>
<th>Principles</th>
<th>Shared tools*</th>
<th>Rules/conventions</th>
<th>Community</th>
<th>Division of labour</th>
<th>Object of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity system</strong></td>
<td>Ask about tools used, strategies employed in the use of tools. Documents may illustrate mental models</td>
<td>Documents relating to policy and procedure Ask about practices relating to relevant actions and activity</td>
<td>Ask about other organisations involved in an identified focus of collaborative activity</td>
<td>Documents relating to policy and procedure Observe power relations in any observations Ask about allocation of tasks</td>
<td>Ask about focus of activity Documents produced in relation to the focus of activity</td>
</tr>
<tr>
<td><strong>Multi-voicedness</strong></td>
<td>Ask about range of tools used and preferences Observe for any differences in tools used</td>
<td>Documents – minutes if possible Observe for any different perspectives of rules</td>
<td>Observe different perspectives Ask about other groups involved and linkages to other groups</td>
<td>Ask about and observe any tension in interaction within the groups and between other groups</td>
<td>Ask about different subjects perceptions of the object of activity</td>
</tr>
<tr>
<td><strong>Historicity</strong></td>
<td>Ask about changing practices over time Documents may assist in identifying this also</td>
<td>Ask about changes in practices (which will reflect changes in ways of doing things)</td>
<td>Ask about changes in linkages</td>
<td>Ask about changes in power distribution and task assignment</td>
<td>Ask about changes of focus over time</td>
</tr>
<tr>
<td><strong>Contradictions</strong></td>
<td>Ask about examples of dilemmas/conflict/tensions in relation to tools and practices surrounding those tools</td>
<td>Ask about examples of dilemmas/conflict/tensions in relation to rules and activity</td>
<td>Ask about examples of dilemmas conflict/tensions in relation to communities involved and activity</td>
<td>Ask about examples of dilemmas/conflict/tensions in relation to task allocation and distribution of power and decision making and activity</td>
<td>Ask about examples of dilemmas/conflict/tensions in relation to the focus of activity</td>
</tr>
<tr>
<td><strong>Expansive transformation - questioning, collective change</strong></td>
<td>Ask about any questioning of tools and practices, modification of tools and practices, the changing of tools and creation of new tools</td>
<td>Ask about any questioning of rules, and for examples of rules that have changed</td>
<td>Ask about any questioning or expectations of change or demands for change by community members</td>
<td>Ask any questioning of power relationships, changes in task allocation and shifts in power</td>
<td>Ask about questioning of, modifications of or new directions in the focus of activity</td>
</tr>
</tbody>
</table>

* Includes cognitive tools such as mental models, as well as physical artefacts
3.3.3.3 OBSERVATION

As I began this study without any contacts in the information technology industry, I commenced data collection by building the beginnings of a rapport with participants through attending scheduled, formal meetings as a non-participant. Observation is not objective (Denzin and Lincoln, 2000, p. 644; Angrosino and Pérez, 2000, pp. 678–696). The observation techniques used were not the immersion of an ethnographer, but of an outsider attending structured meetings. In most instances this involved being present as a non-participating observer or ‘outsider’ (Creswell, 2005) who had been introduced as a researcher. Observations, listed in Table 3.4, included observing meetings in Stage 1, and in Stage 2 I attended industry seminars and a conference report-back.

3.4. ANALYSIS

The process used to analyse the data was similar in both Stages 2 and 3. Huberman and Miles (1994, p. 332) note that an iterative, inductive approach begins with the commencement of data collection through making margin notes and summary sheets. I used a range of margin notes in the first phase of interpretation, noting factors as diverse as contextual factors, tools for collaboration, factors that clarified the nodes of the activity system that the respondent was from, and use of language.

The next step was to organise easy storage and retrieval of data. To assist this process I used the software program NUD*IST. NUD*IST is an ideal tool for this purpose. Transcribed interview data and a summary of some documentary material were imported into the program. This process was followed by developing an organising system of categories or themes and tagging the category (Tesch, 1992, p. 113). In this way a ‘tree’ of codes of categories was developed as shown in Appendix 8. This was not only a means of organising the data but forms an initial level of analysis. Examples of data coded against nodes are given in Appendix 9.
Once this process was complete I was then able to move between refining the categories through the writing of memos – see examples in Appendix 10 and very occasionally the further development of categories. Tesch points out that the researcher is interested in developing ‘concepts’:

which entails an effort to formally identify themes and to construct hypotheses (ideas) as they are suggested by data and an attempt to demonstrate support for those themes and hypotheses. By hypotheses we mean nothing more than propositional statements (Tesch, 1992, p.113).

Memos were an invaluable means of assisting me to develop a deeper analysis. Ryan and Bernard (2000, p. 784) note that memoing is one of the principal techniques for recording relationships among themes. Strauss and Corbin (1990) describe three kinds of memoing: code notes describe concepts being discovered; theory notes summarise ideas about what is going on in the text; and operational notes are about practical matters. The memos I wrote in NUD*IST were principally describing concepts being discovered and theory notes.

These processes, used in both stages, are discussed in more detail in the following two sub-sections.

3.4.1 ANALYSIS OF DATA COLLECTED IN STAGE 2

In this stage, data from each institution was mapped onto the schematic representation of an activity system (Engeström, 1987). This was done diagrammatically and in text as shown in Appendix 11. An initial text analysis followed, looking at language use, the placement of the subject in the dialogue and indications of values. Looking for themes and forming ‘abstract constructs’ (Ryan and Bernard, 2000, p. 780) in Stage 2 was undertaken in a number of ways:

- Identifying themes from the data itself, this process is informed by the review of the literature and my own experiences and heuristics
- Drawing on activity theory by mapping the nodes of each activity system and the contradictions in each system
Textual analysis of documents to identify both themes and consistencies and inconsistencies between interview data and the documents

Analysis of documents and thematic analysis included an initial historical analysis of institutions and of the specific institutions involved in this study at a descriptive level at this stage. Historical, industry and policy environment analysis assists with establishing contextual influences on activity. (Note, at this stage this was how I conceptualised context.)

Mapping the activity systems allowed me to identify the object of activity of each activity system and therefore the overlapping object of activity and object of production in the ‘boundary space’ analysed in Chapter Seven.

At this point I noted that existing frameworks explored in the literature did not explain the data. I proceeded to move back into the literature to look for concepts that might explain what I had identified in the data, using the data and the literature to develop a framework. This framework was further developed and modified through analysis of data collected in Stage 3.

3.4.2 Analysis of Data Collected in Stage 3

Analysis in the third stage of data collection involved similar processes to those outlined above. The following concepts, explained in Chapter Six, were key in the Stage 3 analytical process:

- Collaborative object and object of production
- Boundary activity – commitment, communication and participation
- Interaction in the ‘boundary space’, and later in this stage
- Social relations of production

These concepts were critical to analysing the data at this stage. They were supported by the process of memoing referred to earlier in this chapter. Other analytical tools used in this stage included analysis of the documentary evidence and of interview data. An analysis of underlying assumptions in interviews was undertaken by looking for language that illustrated underlying, taken for granted assumptions. Examples are given in Chapter Seven. A similar process was used when looking at documentary evidence, including minutes and reports.
3.5. Limitations

As an outsider to the information technology industry and to these particular institutions, establishing credibility was necessary in order to establish trust. Given that collaboration between institutions takes place in multiple ways, across multiple sites and that contributions towards collaborative activity can take place at unexpected times and places establishing trust and credibility are problematic. Issues surrounding the ability to ensure confidentiality when the industry being studied is such a small one, compound these concerns. These concerns had a potential impact on the level of detail some respondents were willing to provide.

As a case study there are aspects that are peculiar to the case and therefore not generalisable (Stake, 2000, p. 446). However, as Stake (2000, p. 448) notes, ‘the utility of case research is in its extension of experience’. The development of the theoretical framework provides a basis for others to compare their experiences in institutional collaborative activity and the influence of context on that collaborative activity.

Analysis is limited to historical recollections of what tool place, ruling out an active interventionist approach. The decision to collect historical recollections was a factor of working as an ‘outsider’ without resources to be involved in an evolving example of institutional collaborative activity.

3.6. Summary

This chapter has discussed the research design employed in this iterative, qualitative case study of collaboration between Tasmanian information technology institutions. A three-stage process of data collection was informed by using Activity Theory to develop data collection tools and to assist with analysis. In the analytical processes, Activity Theory was one of a number of
concepts and theories employed to develop an understanding of contextual conditions, collaboration and learning.

A range of processes for judging the ‘rigor, breadth and depth’ (Denzin and Lincoln, 1994, p. 4) of this qualitative case study were employed and are listed as they have been applied to this study in Table 3.1.

The next chapter provides some necessary background to the study, describing the Tasmanian information technology industry. In all subsequent chapters the voice of the third person is employed.
THE TASMANIAN INFORMATION
TECHNOLOGY INDUSTRY

4.1 INTRODUCTION

Chapter Three explained the methodology employed in this study and in so doing highlighted the importance of context in the framing of data collection and its analysis. A key premise of this thesis is that learning and context, framed as contextual conditions in this thesis, are dynamic and interactional. To understand this interaction, it is first necessary to know the background of the case study, namely the Tasmanian information technology industry itself. This chapter describes the principal features of the Tasmanian information technology industry and situates it within the national industry. National policy related to the information technology industry is part of the context
within which this state industry operates and accordingly a brief overview of this policy is provided. The section on policy includes a brief description of clusters as part of national policy, as the focus of the study is a study of a developing cluster, as explained in Chapter Three. Tasmanian government policy is explained in Chapter Five in the description of the government institution, Department of State Development. To situate the Tasmanian industry, this chapter commences with a brief description of the island State of Tasmania, the site of the study.

4.2. THE ISLAND STATE OF TASMANIA

Figure 4.1 Map of Australia

As Figure 4.1 illustrates, Tasmania is Australia’s island state. It is the smallest state in Australia with a population of 456,652 persons (ABS, 2003) and a total area of 67,943 square kilometres. Important industries include timber and a range of agriculture which is confined almost exclusively to small farms. The raising of sheep for wool in the east and dairy farming in the northwest are also important. The mining of copper, zinc, tin, lead and iron has increased in recent years. Tourism also is growing in significance, due in part to better ferry connections to the Australian mainland. There is a considerable discrepancy between industries recognised as ‘important’ to the

Figure 4.2 Map of Tasmania

state for their economic activity and those that are the largest employers. The largest employers are retail, health and community services, manufacturing and education in that order (ABS, 2003).

The Australian Bureau of Statistics defines the state as regional. The only population centre that meets the definition of metropolitan (100,000) is the capital city of Hobart situated in the south which has a population of 190,000. Most of the population is in the south of the state with the remainder dispersed across the north and northwest.

The information technology industry in Tasmania is small and much of the information technology industry activity takes place in Hobart (Whitehorse Strategic Group, 2004). As identified in Chapter Two research and educational institutions are important to the information technology industry. The state has one university with campuses in each of the three regions (south, north and northwest), one Technical and Further Education Institute (TAFE) also with campuses in each of the three regions. There are multiple research institutions such as the Australian Antarctic Division, the Commonwealth Scientific and Industrial Research Organisation and the National Fisheries Office all based in Hobart, and the Maritime College in Launceston in the north. The following sub-section commences with a description of the national industry followed by an explanation of the Tasmanian industry.

4.2.1 The National Information Technology Industry

The Australian information technology industry is a growth industry, accounting for some 10% of gross domestic product (AIIA, 2002). The industry is one of the fastest growing in the Australian economy with a sustained growth of 17% in the 1990s bringing annual sales to $75 billion (NOIE, 2003, p. 5). The impact of the dot-com crash in 2000 had worldwide reverberations resulting in global contraction in the industry and accelerating
the contraction of multinational activity. In Australia there were layoffs in the industry, less research and development activity and outsourcing of production. As the consequences of the crash continue to unfold, Australia’s efforts to attract global investment is challenged by a significant shift of information technology capital into Asia. Despite this, the National Office of the Information Economy claims that some parts of the industry have continued to grow and the expectation is one of strong growth particularly for computer services (9.2% per annum), telecommunications services (8.3% per annum), film and video services (7.7% per annum) and photographic and scientific equipment sectors (8.5% per annum) (NOIE, p. 5). Growth rates, however, are considerably less than the 17% of the 1990s.

Australia is among the top five nations in the world for spending on information technology as a percentage of GDP (AXISS Australia, 2005). AXISS Australia (2005) reports that businesses in Australia are significant users of technology, with a February 2000 survey suggesting that 84% of small businesses and all medium businesses use personal computers. A significant proportion (over 35%) of Australian businesses was reported as having some form of online presence.

The information technology industry is also a growing area of employment. The Australian Computer Society (Australian Computer Society, 2001) claims there are some 235,000 Australians employed in the main ‘ICT’ producing industries – 2.7% of Australia’s total employment. When ‘ICT’ jobs and estimated support jobs in other industries are added to this, it suggests that there are at least 683,000 Australians depending on this industry for their livelihood (Australian Computer Society, 2001).

Projected and actual ‘growth’ rates of an industry are rarely reflected at the same rates in the employment figures. Employment projections for this industry nationally indicate a steady growth of between 3%–5% across most sections of the industry (TACITPRITAB, 2001, p. 7). Small businesses (less
than 20 employees) make up 96% of the Australian information technology businesses (AIIA, 2002). This 96% of businesses in the industry account for 24% of employment and 12% of total income in the industry (TACITPRITAB, 2001, p. 7). In November 2000 almost 140,000 (41%) of all information technology jobs in Australia were in property and business services, 35,600 (10%) in communication services and 33,900 in the wholesale trade and 27,400 (8%) in manufacturing. Growth is particularly strong in health and community services (Australian Computer Society, 2001, pp. 7–8).

Much of the work in this industry is highly paid with an increasing shift towards well-paid professional jobs (Australian Computer Society, 2001, p. 8). A growing trend towards the employment of contractors and outsourcing of work is increasingly characteristic of the industry. Self-employment and small businesses are playing an important role in the industry.

The above figures are predominantly from industry bodies such as professional associations, industry training advisory bodies and government sources such as the ABS. In summary these bodies portray the industry as:

- A growth industry
- An important contributor to the Australian economy
- An enabling industry (one that is important to and underpins all industries), but also as important in its own right
- An employer of highly skilled, professional personnel
- An industry with dominant labour market arrangements of contracting, outsourcing, self-employment
- An industry predominantly made up of small businesses (typical of Australian industry in general)

4.2.1.1 The Tasmanian Information Technology Industry

Information about the Tasmanian information technology industry has been scant and incomplete. Only in August 2003 was the first survey of the industry published. This first survey was undertaken for 2001/02 with a second report for 2002/03 published in June 2004. Such information is important for a new industry, as it informs policy and industry personnel of
industry directions, how the industry works, what is present and what is yet to be developed. The OECD (1999, p. 3) notes for example that:

For policy design and evaluation purposes, governments need to be able to monitor as accurately as possible recent trends and structural shifts pertaining to industry and technology.

The Tasmanian industry is a very different one from the industry in larger Australian states, facing different challenges. In Tasmania for example, there are no shortages of information technology skills, unlike the situation in other Australian states. Rather in Tasmania there are limited business development growth skills. Unlike mainland states, Tasmania does not have large firms providing a skills and industry capability (particularly lobbying and political nous).

In Tasmania the information technology industry is small with approximately 250 companies in the industry; the majority of these companies are micro businesses and small traders. In the communications sector of the information communications and technology industry, in which there are some 114 companies, 76% of these companies employ fewer than ten employees. In the computer services sector of the information technology industry in Tasmania, up to 95% of companies employ fewer than ten employees (TACITPRITAB, 2001, 2002). The Whitehorse Report (2004) states that almost 90% of Tasmanian information technology companies employ fewer than 20 staff with the balance of companies employing a significant proportion of the workforce and accounting for the vast majority of the revenue.

The Whitehorse Report published in 2004 reports that employment in the Tasmanian information technology industry is estimated to be at 2,800, an increase of 100 from the previous year, reflecting consistent growth. This is 1.4% of Australia’s total information technology industry employment in an industry of 199,000. Notably there are fewer computing professionals in the state (44%), compared to employment of computer professionals Australia-wide (59%). There are also a smaller percentage of information technology managers (5%) in the state, compared to 9% nationally. This is unexpected
considering that relative to other states Tasmania has a strong research and development base ($11.3 million or 1.7% of national research and development) per capita in the industry. Much of this, however, is in the telecommunications sector (55%) which accounts for 54% of total employment in the industry (Whitehorse Report, 2004).

Interestingly, 18% of Tasmanian information technology companies with head offices outside the state employ 60% of the industry’s workforce. Therefore experience that might be gained from working in a head office, such as marketing, collaboration, lobbying government and working with other industry institutions, is likely to be much more limited in Tasmania.

The vast majority (88%) of information technology companies in the state are Australian-owned, generating 71% of the state information technology industry’s revenue. The highest economic value sector of the industry, research and development of products, accounts for 6% of employment, compared to the lower economic value sector of retail distribution and sales accounting for 65% in 2002–03 (Whitehorse Strategic Group, 2004). This has implications for the possibilities of accessing niche global markets. The Marine ICT Cluster referred to in Chapter Three provides such an opportunity, not only for accessing niche global markets, but for creating further employment spin-offs over time.

Only 27% of Tasmanian information technology companies exported goods or services internationally, an increase of just 2% from the previous year. Fifty-seven percent of companies occasionally or frequently use business/market intelligence in the operation of their company. Interestingly, target markets are predominantly the information technology, education and government sectors of the market, accounting for 37% of markets listed (Whitehorse Strategic Group, 2004). This again reflects the small size of the industry and the state, with government being the major customer. These factors limit interconnections with other industries, and in turn are perhaps a
reflection of the limited horizons of the industry in the state. As a participant in this study noted, in 2002 there were less than a handful of leaders in the state information technology industry. Not having the ‘big captains’ of industry makes diffusion difficult. Commonwealth Government and national industry employer organisations often assumed the same resources were available in Tasmania as were available in the larger eastern mainland cities of Sydney, Melbourne and Brisbane.

**Figure 4.3: Age profile of Tasmanian information technology companies**

![Pie chart showing age profile]


Figure 4.3 gives the age profile of the information technology companies in the state. Only 29% have been established for over 11 years. Most have been established between six to ten years, just past the start-up phase. Nearly a quarter of companies are start-up companies of zero to five years. This gives a very clear picture of the youthfulness of the industry in Tasmania and has implications for collaborative experience in the industry. The total revenue of $1.2 billion represents 1.8% of the national total. The sectors most relevant to this study (manufacturing of hardware and software, software consulting services and distribution of hardware or software) account for just 25% of the state’s total information technology industry revenue. Notable also is that the average revenue per employee ($179,000) is well below the national average ($329,000). Tasmania has a large number of companies that have revenues less than $100,000 per employee. This suggests there is both a need for
collaborative activity to enable greater revenue earning capacity but also less capacity to contribute to collaborative arrangements, as will be discussed in Chapter Five. Not surprisingly the Whitehorse Report suggests that established companies are more likely to have set up partnerships; however a large proportion (65.2%) of companies did not have any strategic alliances with other companies (Whitehorse Strategic Group, 2004).

Training requirements are largely business and management skills (TACITPRITAB, 2001, 2002; Whitehorse Strategic Group 2004) indicative of limitations on and limited experience of collaborative activity between firms.

The following section explains the national policy environment in which the information technology industry operates.

4.3 National Policy

As identified in Chapter One and discussed in detail in Chapter Six, policy is a contextual condition that mediates activity. It is therefore necessary to have an understanding of national and state policy mediating activity in the information technology industry.

Information technology is considered to be integral to science, innovation, competition and the rule of the market. All are identified as necessary for success in the information economy. As discussed in Chapter Six the combination of these contextual conditions is a dominant part of the discourse of policy related to information technology (see e.g. OECD, 1999; Chief Scientist, 2000; Australian Institute for Commercialisation, 2002). In policy documents innovation, for example, is given considerable status as ‘the driver of every modern economy’ (Chief Scientist, 2000, p. 5). The National Office
of the Information Economy (NOIE) links information technology, the information economy, productivity and competition:

If Australia can sustain a supportive macroeconomic environment and vibrantly competitive markets while creating more flexible labour markets, it will be well placed for a second wave of sustained high productivity growth and consequently broader social opportunities.

With general purpose technologies such as ICTs, and their potential to raise productivity throughout the economy, the early international winners will be those who can harness the technology through competition in a good investment climate to finance the most competitive, productivity-enhancing uses of the new technologies. (NOIE, 2003, p. 1).

And the Framework for the Future:

Australian public R&D is important to innovation in the private sector, and the benefits of individual projects can be substantial (Framework for the Future, 2003a, p. 42).

The construction of the symbiotic relationship of higher productivity, information technology, innovation and competition is typical of international policy and research. Tools and strategies particularly relevant to this thesis for encouraging such symbiosis include encouraging new start-up companies through relationships with research institutions and CRCs (The Framework for the Future, 2003a). The Framework for the Future (2003a, p. 54) notes that Australian companies have progressively increased their rate of new firm formation and spin-off or start-up companies from research organisations. Cooperative Research Centres (CRCs) are particularly important for information technology spin-offs (Framework for the Future, 2003a, p. 55).

However, there are difficulties faced by spin-off activity from relationships between research institutions and new firms:

Of all the stages in the innovation process, it is the transition from research and development through incubation and commercialisation that creates the most difficulty for new firms. Many firms fail at this stage because they cannot obtain funding, appropriate management skills or access to advice to grow their innovative ideas (Framework for the Future, 2003a, p. 52).

It would therefore seem important for support to be provided to such companies. Tasmanian government support is discussed in Chapter Five. But, as will be argued in later chapters, despite a number of relevant programs
such support is not necessarily flexible enough to cater for a range of situations.

4.3.1 Clusters

Clusters are important in this thesis because an information technology cluster was a focus of data collection and analysis as indicated in Chapter Three. Clusters in the information technology industry are one significant strategy in developing firms’ capacities. Policy on clusters provides a framework for dialogue and cooperation between firms, the public sector and non-governmental organisations, leading to efficiency in, for example, marketing, training and division of labour between the cluster members (OECD, 2000, p. 4).

There are many different conceptualisations of a cluster. A cluster can be defined as containing a small or large number of enterprises, as well as small and large firms in different proportions. Some clusters are comprised principally of small to medium enterprises (SMEs) (OECD, 2000, p. 4). A cluster can also be defined as networks in which there are strong exchanges of information between producers and users. This understanding describes clusters as ‘networks of production of strongly interdependent firms linked to each other in a value-adding chain’ and can include universities, research institutions, knowledge-intensive services, brokers and consultants, and customers (Roelandt and Hertog, 1999, p. 9). As will be shown in Chapters Seven and Eight, both these conceptualisations of cluster were held by different institutions involved in the Marine ICT Cluster.

Australian policy documents give recognition to the value of clusters, ‘industry clusters are an important way of building and adding value to linkages between firms and with the research sector’ (Framework for the Future Steering Committee, 2003, p. 59). However, it is noted that there are weak linkages between the private sector and public sector research
organisations. To address this the Framework for the Future Steering Committee (2003, p. 60) recommended that state governments take the lead in bringing together ‘major focal points of research and development activity and the innovation infrastructure, incubators with potential industry partners, to drive cluster development’. Such a strategy is necessary for a number of reasons, but notable for the purposes of this thesis, is the Framework for the Future’s comments that:

[There are] marked differences in the research focus between the public and private sectors [which] may affect the support that can be provided to industry, particularly through:

- the supply of high end skills such as software development; and
- the ability to build strong networks that facilitate knowledge flows between business and the public research sector (Framework for the Future, 2003a, p. 45).

The onus on developing clusters is here placed on state governments. In addition, there is a recognised need to facilitate networks and information flow between the research institutions and private sector firms. The Tasmanian State Government at the time of investigation had not developed policy in relation to clusters.

Tasmanian information technology government policy is discussed in Chapter Five, as part of an explanation of one of the institutions – Department of State Development – that was part of the evolving Marine ICT Cluster.

4.4. Conclusion

The Tasmanian information technology industry is a small, but growing sunrise industry consisting largely of micro firms with less than one-third exporting goods or services to global markets. It is dominated by the telecommunications sector of the industry which employs and contributes more research and development than other sectors.

State Government is the major customer, and perceived by the industry as critical to the development of the industry. The industry operates in a policy context that has changed from being inward-focused to one that is beginning
to reflect the discourses of innovation and entrepreneurship constructed as critical to competing in a global market in today’s information economy. There are a number of programs to assist start-ups and other programs to assist more mature companies to develop to the next stage of development to participate in the global market place.
Chapter 5

Collaboration in the Tasmanian Information Technology Industry

5.1. Introduction

Chapter Four described the Tasmanian information technology industry as small, consisting largely of micro firms with less than a handful of medium-sized companies. The Tasmanian industry offers limited opportunities for developing experience in high-level business skills, including marketing, collaboration, lobbying and working with industry institutions. The highest economic value sector of the Tasmanian information technology industry, research and development of products, accounts for only a small percentage
of employment. Companies that export are limited in number and less than one-third of companies have been established for more than 11 years, with most having been in business just long enough to survive the start-up period of five years. All of which has implications for the Tasmanian industry, posing particular challenges for collaboration between firms and for the ways in which industry institutions work together to support and develop the industry. These issues will be discussed in this chapter, addressing the first of the research question: what is the experience of collaboration between institutions in the Tasmanian information technology industry? Data drawn on to address this question is largely data from 2002, the second stage of data collection in which existing institutions in the Tasmanian information technology industry was interviewed.

The chapter commences with an analysis of each of the relevant industry bodies which were interviewed for this study. As identified in Chapter Three these institutions were:

- TasIT
- Department of State Development (Department of State Development)\(^1\)
- Intelligent Island
- The Industry Training Advisory Board (Industry Training Advisory Board)
- Information Technology Industry Council.

Others referred to in Chapter Three are not discussed in detail here as they were not strongly linked to the events that form the basis of this study. This first section provides a background from which to analyse the collaborative experience between Tasmanian information technology institutions.

**5.2 Tasmanian Information Technology Institutions**

In collaborative activity it is necessary to understand something of each of the participating institutions in order to appreciate what influences their horizon of possibilities and what limits their horizons. A useful way of thinking about

\(^1\) The Department of State Development changed its name towards the end of this study and is now known as the Department of Economic Development.
industry institutions is that each institution is an organisation with different histories, identities, cultures, structures and practices. Blackler, Crump and McDonald's (2000) note that work organisations have a complex division of labour and because of this, participants’ “understandings of the links between their actions and the overall activity system of which they are a part can become obscured” (p.281). Therefore these authors suggest that rather than analysing organisations as single activity systems, it is “more satisfactory to analyse them as networks of overlapping activity systems (p.282)”. To enable an appreciation of the complexity of each of “the networks of overlapping activity systems” that constitute each of the industry institutions that are important in this study, the following section provides a brief history of the range of complexity of activity within TasIT, Intelligent Island, the relevant section of the Department of State Development, Information Technology Council and the Tasmanian Information Technology Industry Training Advisory Board.

5.2.1 TASIT

TasIT is the only institution representative of employers in the information technology industry in Tasmania, and as the initiator of the Marine ICT Cluster, TasIT is critically important to this study. Below follows an outline of the history of this institution, its motive or need it is meeting, what governs its operation and some of the tools used by the institution.

TasIT was formed in 1997. It is a lobby group for employers with a mission to encourage the development of the Tasmanian information technology industry and assist local companies to network to gain large projects:

[The origin of TasIT was] about local companies working together and learning a lot from each other. The purpose was that they would be able to collaborate together to gain bigger projects and by working together they’d be able to create much more awareness of their skills and knowledge and abilities that existed. They’d be able to argue for work to be retained in the State rather than people not being aware that the work could be done here and instead going to larger interstate companies…TasIT certainly actively lobbied right from the word go to have business done locally rather than interstate (2002 interview).
The State Government is a major customer and employer in the state, so TasIT feels strongly that government is a major source for industry development through providing winning tenders to local companies.

TasIT is an incorporated body and must follow the rules set out in the *Associations Incorporations Act 1964*. It has a Board, including a Public Officer as required under the Associations Incorporations Act, an elected Committee and a part-time paid officer. The division of labour with only one part-time paid officer reflects limited resources. Much of the work of this organisation is undertaken as a voluntary contribution. Its community is made up of its members from small or micro firms to large government instrumentalities which rely heavily on the use of information technology.

Historically, TasIT was viewed by some as a young, belligerent organisation. Early in its life it was regarded as having a ‘manic fringe’ (2002 interview) but as it gained more representative membership it moved away from being less confrontational to a more representative style of lobbying government as suggested by this respondent:

> What TasIT has done in the last couple of years is started to get more representative membership and also to get out there and lobby and make public statements (2002 interview).

However, the change in style did little to change relations with State Labor governments. According to some TasIT members, relations with State Government were tainted by a perception that TasIT was perceived by government personnel as a tool of the conservative Liberal Government. This was because TasIT was established at the time of a State Liberal government. In 2002 some respondents reported that TasIT was ‘not given information’, was ‘deliberately kept on the edges’, and had only ‘recently’ been included in mailing lists by the Tasmanian Labor Government, because of the perception by the governing Labor Party that TasIT owed its loyalty to the Liberal Party. This is relevant to this study, as in 2002 there was still considerable tension between TasIT and the Department of State Development and also Intelligent Island. Some members of TasIT perceived government as not being prepared
'to get behind the industry, supporting the actual companies’ and using ‘top
down approaches’:

No effective consultation, what do you want, what can you achieve and how
can we really build this industry (2002 interview).

At this time there was a history of mistrust between TasIT as an organisation
and the Department of State Development. That TasIT felt it was deliberately
excluded and that Labor government personnel believed TasIT to be a Liberal
government front were part of the historical background to interactions
between TasIT and government bodies.

As part of ensuring information flow and opportunities for members, TasIT
emails a monthly electronic bulletin to members. Information includes social
and industry activities organised by TasIT and activities organised by the
Australian Computer Society, Intelligent Island and other industry
institutions. Examples include telecommunications workshops (TasIT
ebulletin, December 2001), Industry Training Advisory Board skills reports
(TasIT ebulletin, May 2002) and Australian Computer Society workshops and
conferences. The bulletin also advertises regular social activities and site
visits such as the Australian Antarctic Division’s multi-media centre and the
Intelligent Island Incubator that may be of interest to those in the industry. It
includes tender information, and encouragement to refer to websites such as
the Australian Information Industry Association (AIIA) to gain further
industry information and listings of events. These items reflect considerable
networking and information exchange with other organisations. Such
activities and forms of communication provide opportunities for members to
get to know each other’s skills and a necessary first step in forming interfirm
alliances as suggested in the discussion in Chapter Two of the networking and
regional milieu literature,

In summary, TasIT is an industry institution which is a small lobby group of
employers in the Tasmanian information technology industry; it has limited
resources and is heavily reliant on industry volunteers.
In comparison, Intelligent Island was serviced by a Board made up of members from large organisations and had a paid secretariat of several people.

### 5.2.2 Intelligent Island Board and Secretariat

The Intelligent Island Board was set up to allocate $40 million from the part privatisation of the national utility, Telstra. The Intelligent Island mandate was to strategically invest its funds to stimulate higher, sustainable growth levels in the Tasmanian information technology industry (http://www.development.tas.gov.au/initiatives.html). Intelligent Island was disbanded in 2004 once it finished its allocation of funds, and State Government personnel now administer remaining matters and funds not yet spent. The major initiatives, as argued later, that became tools of Intelligent Island are the:

- **Incubator**
  This is a joint venture involving KPMG Tasmania (a large international firm), the University of Tasmania and others, receiving $8 million in funding

- **Enterprise Development Fund**
  Enterprise Development Funds were dispersed to: the Software Sector Cluster; a Virtual Board whose purpose is to provide advice in sales, marketing, finance, law and business resources; the Marine ICT Cluster; e-Health Community Cluster; Creative New Media Cluster; the Tasmanian Information Technology Directory which provides information about the capabilities of Tasmanian information technology businesses; the Tasmanian information technology survey; Software Mark and a Commercialisation Fund.

- **Centre of Excellence**
  $20 million was allocated to this project. The Board originally identified a Bioinformatics Centre of Excellence, but following some research into the Tasmanian context developed a project for a Health Informatics Centre. This project collapsed and at the time of writing, other possibilities for the funds are being explored.

- **Investment attraction**
  E-learning provides new information systems to support the delivery of education services and manage educational administrative processes

- **Telecommunications**
  The telecommunications initiative investigated the telecommunications infrastructure and services available to the information technology sector and if, or to what extent, current Tasmanian telecommunications infrastructure inhibited growth.

- **Marketing**
  Funding was provided to 20 Tasmanian information technology companies through 10 marketing programs to participate in national and international industry forums,
including exhibitions in the United States, the United Kingdom and Portugal (http://www.development.tas.gov.au/initiatives.html).

The division of labour in Intelligent Island included a full-time secretariat and a Board consisting of a Chair from a large interstate company, the Senator responsible for negotiating the $40 million for the state, public servants, the University of Tasmania and a local private company. That the Chair was from Sydney and headed a branch of a large international company with limited knowledge of the small Tasmanian information technology industry is important. As will be argued in later chapters, the limited knowledge and understanding by Intelligent Island of the local industry was TasIT’s perception of Intelligent Island, setting up mistrust between TasIT and the Intelligent Island Board.

Its funding came from the Australian Government and it is administered through State Government administrative arrangements. The Intelligent Island Board and Secretariat are therefore bound by the rules, protocols and values of the public service. Notably there are no representatives from state industry bodies on the Board. This was a further source of tension between industry members and the Board.

5.2.3 TASMANIAN DEPARTMENT OF STATE DEVELOPMENT

Like all government agencies there are multiple sections and units providing multiple services and advice in the Department of State Development, all of which change as new ministers are elected. Over the period of this study the state was governed by a Labor government (elected in 1998) after a long period of conservative Liberal government. For the purposes of this study, the Department of State Development refers only to a small number of personnel from different units in the same agency but all with some responsibility for the information technology industry in the state. The following quote summarises the focus of these personnel:

Industry development in technology and innovation based industries to develop and foster a culture of innovation in Tasmanian industries, develop
technology industries like technology and the bio-tech sectors and increase the take-up of technology in Tasmanian industry as well…It’s partly encouraging entrepreneurs, partly setting the sort of macro environment so that people can get access to the types of things they need to do to commercialise their innovations, like finance, mentoring, other assistance, access to partners, access to markets (2002 interview).

The agency has developed a number of tools in the form of programs to assist it achieve its object of developing the industry: *Tasmanian Innovations Program, ICubed, Ideas to Goals and Market Ready Commercialisation Program.*

*Tasmanian Innovations Program* assists SMEs in the commercialisation of innovative products. Successful applicants must meet criteria such as having a product that has a high level of innovation that can be delivered to meet an established international market demand.

*ICubed* is a network for innovators, investors and intermediaries aiming to provide opportunities for investors and innovators to ‘hook up’ and encourage company expansion and commercialisation activity. Successful examples include a technology company and venture capitalist developing an arrangement where the venture capitalist bought 10% of the technology company for $1.4 million. Another example was a larger company collaborating with a small company to provide commercialisation experience.

*Ideas to Goals* is a program for early stage entrepreneurs who want to learn about what is meant by a trade mark and what the implications are of having a trade mark, intellectual property, and accessing venture capital at early stages of their development. There was limited information about these programs available in the public arena in 2002, at the time when the Marine ICT Cluster was developing.

*Market Ready Commercialisation Program* is a series of facilitated workshops providing successful applicants with the necessary skills to take
innovative ideas to market and undertake commercialisation and business growth. Selection for the program is based on the level of innovation of the project and the stage of growth of the company applying.

A complex mix of legislation, public service protocols and values mediate the work of these public servants. This contrasts sharply with private industry which operates under very different regimes in relation to time and expectations resulting in stereotypical perceptions from agency personnel and from private business in the information technology industry.

As part of general industry policy the Labor government established a number of industry councils, including an Information Technology Industry Council. The Government uses these councils to advise it of industry needs and future policy development.

5.2.4 INFORMATION TECHNOLOGY INDUSTRY COUNCIL

The Information Technology Industry Council of Tasmania is one of eight state industry councils arising from the industry audits the Labor government undertook when it first came into office. The Tasmanian Information Technology Industry Council was established to engage the Tasmanian information technology and telecommunications industry in industry planning and in developing an action plan (Information Technology Industry Council of Tasmania, 2000). The Information Technology Industry Council of Tasmania plan has five goals:

- Create a flexible and diverse information technology skilled workforce
- Ensure technology is an enabler for all industries
- Support innovation and entrepreneurship in the industry
- Develop infrastructures and
- Enable access to local, national and international markets

(Information Technology Industry Council of Tasmania, 2000).
Council membership is by invitation from the Government. The 13 members include key personnel from major information technology businesses in the state, a number of public servants from different agencies and a member from TAFE Tasmania. There are no formal representatives from state industry institutions such as the Australian Computer Society and/or TasIT.

The Council meets regularly with the Chair expecting members (at the time of 2002 interview) to be actively involved in a project or projects. The Council has moved from having a limited perception of its potential to a growing sense of autonomy, establishing its own rules and tools:

> What [Council] do have in the way of resources is to be able to influence the way that government works, and the approach that’s being followed…
> [Command resources for] a research project to be put together or funded…
> So that’s a way of engaging government to focus on a particular issue and come up with solutions (2002 interview).

By the time of interview in 2002 the Council was using projects as a means of organising activity, setting up sub-committees drawing on industry members outside of Council. In an effort to have greater contact with firms constituting the industry, the Council held open sessions of their meetings in different areas of the state.

5.2.5 TASMANIAN INFORMATION TECHNOLOGY INDUSTRY TRAINING ADVISORY BOARD

Industry Training Advisory Boards are, or were, the only ongoing formal arrangement in Australia where unions, employer organisations and government met regularly and within a structured arrangement in industry groups. During the late 1990s the role of Industry Training Advisory Boards was to provide a conduit between the Vocational Education and Training (VET) sector and industry. At the national level they were responsible for the development of training packages (industry competencies structured within the Australian Qualifications Framework). In 2002 state Industry Training Advisory Boards undertook a variety of roles including marketing and implementation of training packages and meeting the requirement of their
agreement with the state education departments and the relevant state VET Act. Later in 2002, support for all Industry Training Advisory Boards Australia-wide was withdrawn from both Commonwealth and most state governments. The national Industry Training Advisory Boards continued, but state Industry Training Advisory Boards disbanded or became training providers or operated as a not-for-profit organisation providing advice and training for their industry.

Typical of many state Industry Training Advisory Boards, the Tasmanian Information Technology Industry Training Advisory Board was an assembly of varied industries, including the arts, recreation, printing and communications as well as information technology. The Tasmanian Information Technology ITAB had multiple roles including assisting and liaising with registered training organisations (RTOs), industry liaison work, providing information and advice to a range of sources, including schools, job network providers and Commonwealth Government agencies on the workings of the National Training System.

The Tasmanian Information Technology ITAB was required to report to three national Industry Training Advisory Boards. Some funding was provided by the State Government body – the Office of Post Compulsory Education and Training (OPCET), a division of the Tasmanian Department of Education – in return for advice on industry skill development and training needs. While this arrangement strained resources, it also provided a perspective enabling the ITAB to better appreciate the underpinning nature of information technology as a building block for all industries with the claim that demand from the general community for information technology skills was ‘incredibly strong’ (2002 interview) yet uptake in small business while growing, was lagging behind predictions (TACITPRITAB, 2001, p. 1).
5.3. Collaboration between the Institutions

Collaboration between Tasmanian information technology institutions at the time of the 2002 interviews was limited. Collaborative work requires skills and trust gained over time and through collaborative experience. The literature discussed in Chapter Two suggests that the extent of information sharing is closely linked to the goals of each partner (Simonin, 1999) and that coordination takes the form of tacit codes of conduct to ensure information exchange and decision making (Keeble et al., 1998; Lorenz, 1989). As Miettinen and Hasu (2002, p. 4) indicate, there is an assumption that information exchange, coordination and interaction take place in ‘environments’ where information is shared. Such ‘environments’, however, have to be created and developed. The quotes below from two different institutional respondents illustrate that in this small, youthful industry such an ‘environment’ with the attendant skills and trust was not yet developed:

We hadn’t had the skills of working together and the knowledge of working together…None of the organisations knew how to trust each other to work together and politically the industry was weak…It finally got to the stage where they could see what was happening more and more (2002 interview).

Unless we work together as an industry we will be divided. [The respondent then explains attempts for information technology industry bodies to come together] There was this morbid silence, because we hadn’t had the skills of working together and the knowledge of working together…None of the organisations knew how to trust each other to work together and politically the industry was weak (2002 interview).

The implications for the industry of not ‘working together’ were that the industry was politically ‘weak’ and divided. It should be noted here that this division was primarily one between government and non-government sectors. TasIT and the Australian Computer Society, for example, were increasingly sharing information, and in 2001 TasIT acknowledged the ‘sound working relationships we have with other key industry groups such as the Australian Computer Society, the Information Technology Industry Council and the AIIA’ (TasIT, minutes 30 August 2001). Relationships between TasIT, the Australian Computer Society and the Information Technology Industry Council had developed through the involvement of TasIT and the Australian Computer Society in working groups and projects of the Information
Technology Industry Council. This was a recent development and there were still no formal representatives from industry institutions such as TasIT and the Australian Computer Society on the Information Technology Industry Council. As indicated in the quote below ‘sound working relationships’ between TasIT and the Tasmanian Information Technology Industry Council were in fact problematic with a history of scepticism about credibility:

[Government said] let’s us have a group that can talk to us. It was an artificial process, because the government was really saying we’re going to appoint a group of people to advise us and it’s not like us [the Tasmanian industry]. It’s not a lie. The same sorts of Councils exist in other parts of the country with people from some of the biggest companies and ones with the greatest experience in developing the industry or running big companies or advising smaller companies as they came along, an entry role. We just don’t have people like that around. They tended to go for people that are known and have some contact locally. They have public servants in there. Not because they were running big groups but because they had projects. It’s an odd group and its not really regarded, in my context anyway, as being an industry representative body. It seems to be really a government committee (2002 interview).

The irony is that the Information Technology Industry Council of Tasmania is a government advisory institution. That government chose to select individuals from industry and not to select industry representatives is what lies at the source of this frustration. Other information technology industry institutions do not therefore identify with the Information Technology Industry Council of Tasmania. Although the Council offered access to it’s resources to support the bid for the Marine ICT Cluster (email, 17 November 2002), not one interviewee referred to the Council in the 2004 round of data collection. This suggests the relationship between TasIT and Information Technology Industry Council of Tasmania was fractured, that the Council was not perceived as a credible source of industry development.

One respondent suggests that industry representatives on bodies such as the Intelligent Island Board and the Information Technology Industry Council of Tasmania could have improved information flow through consultation, providing these institutions with a ‘voice’ and thus improving their sense of agency:

Its all very well for [names of institutions and industry body] to have good links and to select people to join various processes but unless the consultation takes place in some sort of corporate way without industry
having been involved as the industry representative body or something like that, it loses context. … What we have is individual players and that’s why there’s no level of corporate consultation and in part that’s often why the industry feels so powerless (2002 interview).

Owen and Bound (1998, p. 369) suggest that a history of successfully working through conflict is a characteristic of a ‘learningful’ industry. As discussed in Chapter Two, this ‘knowing’ of being able to work through tension and conflict, and that such tension and conflict is part of the process was yet to be experienced in the Tasmanian information technology industry. As this respondent indicates, bringing people from across the industry together resulted in ‘mud slinging’:

> Bringing groups together under one umbrella that could speak to government with one voice. But very quickly factions emerged and cracks appeared… They don’t know how to manage factional going on and it turns into a horrible mud slinging fight. Whereas perhaps more established factional industries can probably manage their way through that because they understand if we’re going to have an outcome we still have to manage our differences to get through (2002 interview).

An interlocking web of organisations and institutions, that is, institutional thickness’ (Amin and Thrift, 1994, p. 21) was not in place at this time to encourage information flow and knowledge creation or assist with informal mixing between institutions, including research institutions, businesses, local councils, training providers and community organisations. As discussed in Chapter Two, this informal mixing assists in facilitating research collaboration, important for an information technology industry.

The small size of the industry, its youthfulness and the lack of industry representation are obviously contributing factors to this situation. The small size of the industry means for example, as one TasIT member commented, that there was no ability for firms to ‘carry’ employees/owner managers who could devote dedicated amounts of time to assist in the development of the industry. He found himself that the long hours of running a business along with industry work took its toll particularly on family life and business viability. This was a factor for TasIT and the Australian Computer Society but not for Intelligent Island with its secretariat and the Department of State Development. So, what was in place to encourage information flow and exchange?
Three examples, explained below, include Industry-e-speak Forums, The Loop, and occasional meetings to exchange and share information between key representatives from some of these industry institutions.

The Industry-e-speak Forums are an initiative of Intelligent Island, co-sponsored by TasIT, the Australian Computer Society and Information Technology Industry Council of Tasmania. They are designed to keep the Tasmanian information technology sector informed about current issues and leading edge projects (email, 14 November 2002). Examples include presentations by the Australian Information Industry Association (AIIA) (this is the national peak industry body, without a chapter in Tasmania); Austrade Information Technology/Biotech Roadshow with specialists from America, Europe and Asia providing practical assistance to Australian technology companies looking to expand their business into global markets.

The Loop was an initiative of the Information Technology Industry Council of Tasmania and the Department of State Development in consultation with TasIT. TasIT was then commissioned to moderate the Loop website for 12 months. It is a website created for the exchange of information for and about the Tasmanian information technology industry, including jobs, tenders, events and opportunities. While all these parties considered it an ‘excellent concept’, there was considerable disappointment at the limited use of the site.

Occasional meetings between TasIT, the Australian Computer Society, the Information Technology Industry Council of Tasmania and sometimes Intelligent Island were another means of exchange between institutions. As discussed above in the description of TasIT, there was a sense of frustration between TasIT and Government. Yet, in the short time between interviewing early in 2002 and the end of 2002, relations had developed and improved to some degree. One respondent noted that:
the three chairs now meet quite regularly, discuss matters in quite deep confidence and are negotiating boundaries and processes between the organisations and across the organisations such as an information technology industry communications strategy...The position I hope the organisations are in now is one of continuing development of trust (email, 17 November 2002).

The enthusiasm expressed in this quote would not necessarily be shared to the same extent by all involved, but the regular exchange can in part be attributed to participation by the non-government institutions in the ITIC working parties, where participants are drawn from industry.

Despite the tension and mistrust there are examples of these information technology institutions working together to meet a perceived need. In October 2002 a decision extending award coverage and professional rates of pay to graduates other than engineers who have an information technology major and people with sufficient qualifications and experience to be eligible for admission as a member of the Australian Computer Society (Tasmanian Industrial Commission, 2002) was handed down by the Tasmanian Industrial Commission. This decision was based on a submission from the Tasmanian Chamber of Commerce and Industry (TCCI) and the Association of Professional Engineers, Scientists and Managers Australia (APESMA). On becoming aware of this decision the information technology institutions (which had not been consulted) worked together to vary the award. Their concern was with the ‘extensive leave and overtime provisions which some members have suggested will force them to move to less permanent positions and more contracting – given the uneven workflow in some information technology businesses’ (email, 14 November 2002). They jointly (under the management of TasIT) made representations to the TCCI to represent them in the Industrial Commission. One respondent reflected that this was done ‘with maturity and sensitivity’ (email, 17 November 2002).

Opportunities for exchange are, in part, structural issues within the industry. As noted in the discussion above, despite there apparently being a number of avenues for exchange between the institutions there was no established history, as older industries have, of successfully resolving conflict and
understanding that conflict is part of the terrain. As identified in Chapter Two, government and research institutions can contribute to encouraging and developing institutional exchange and collaboration.

Between 2001 and 2004 the focus of Government policy changed. In 2001 policy referred to the need for skills development in information technology and ‘encouraging’ businesses to collaborate and work outside the state, invest in a public sector culture of innovation, equity in terms of access to information technology for all Tasmanians and the development of infrastructure (Tasmanian Department of Premier and Cabinet, 2001). In 2004 terms such as ‘innovative, entrepreneurial culture’, commercialisation, partnerships, ‘integration of research institutions, government and industry’ and the role of regional centres in developing innovative regional milieux (Department of Economic Development, unknown) were prevalent in policy documentation. At this time information was readily available on the different programs offered by the Department of State Development. This shift in focus reflects a growing alignment with national policy, but does not appear to have developed possibilities for increasing institutional collaboration.

Structural arrangements and policy appear to have impeded consistent collaborative activity between government and industry bodies.

5.4 CONCLUSION

In 2002 the Tasmanian information technology industry was described by one respondent as ‘weak and divided’. Information exchange and collaborative experience between the institutions was limited. Despite a range of opportunities for individuals to exchange information through structures such as The Loop, most opportunities of this nature were for firms rather than institutions. Regular meetings which had begun to take place between numbers of Tasmanian information technology institutions were treated with varying levels of respect and usefulness by different participants in those
meetings. However, when there is a need, such as the issue that was brought before the Industrial Commission, collaborative activity appeared to be comparatively fluid. Work of this nature is constrained by tight timeframes and a need for information exchange in order to meet the need.

At the time of data collection there was no depth of collaborative capacity between the Tasmanian information technology institutions nor is collaborative activity between these institutions extensive. The lack of large companies and industry members with extensive experience impacts on the capabilities of their institutions. The existence of multiple and varied opportunities for the flow of information is a first step for collaborative activity. The structural impediments and historical misconceptions between government and other institutions are a barrier to developing a deep understanding of each other. The collaborative activity that has taken place is only the beginning of a journey where each body develops ‘cultural understanding’ (Owen and Bound, 2001, p. 41) of each other and where they develop cohesion and identify with each other (Owen and Bound, 1998, p. 369). These factors require tacit knowledge diffusion, the development of commonly understood rules, norms and problem-solving heuristics as identified in Chapter Two.

This chapter has addressed the first research question: what is the experience of collaboration between institutions in the Tasmanian information technology industry? It was found that there was limited collaborative experience between Tasmanian information technology institutions, a history of lack of trust and limited formal and informal channels for exchange between these institutions. The next chapter looks closely at the contextual conditions that influence collaborative activity.
TOWARDS A CONCEPTUAL FRAMEWORK: CONTEXTUAL CONDITIONS AND THE OBJECT OF COLLABORATIVE ACTIVITY

6.1 INTRODUCTION

The previous chapter dealt with a number of aspects of context in addressing the first research question describing the limited history of collaborative activity between institutions in the Tasmanian information technology industry. The suggestion made in the previous chapter that this limited history of collaborative experience is related to the small size and youthfulness of the industry and its mode of production consisting largely of small companies, is
important data drawn on in this chapter. Also important to this chapter is data collected in Stage 3 in relation to the evolving Marine ICT Cluster to identify contextual conditions that mediate collaborative activity. This chapter addresses the second research question: *what contextual conditions influence institutional collaboration?* The seven contextual conditions and their presence in the collaborative activity of the evolving Marine ICT Cluster are analysed.

The second part of this chapter develops another part of the conceptual framework of collaborative activity, namely the creation of multiple spaces shaped through the object of collaborative activity in what will be called a ‘boundary space’; the ‘space’ in which collaborative activity takes place.

### 6.2 Contextual Conditions

As stated in Chapter One, ‘contextual conditions’ is the term used in this thesis to frame context. Contextual conditions is a term derived from Ilyenkov’s phrase, ‘general system of conditions, a system of interaction’ (Ilyenkov, 1960, p. 4) and Marx’s observation that humans are conditioned by ‘circumstances’ (Fischer, 1968, pp. 155–156). For example, in discussing the centrality of the emerging object and its influence of relations between subjects Ilyenkov (1960) notes what two men who jointly possess a field have in common:

> Is that particular object which each of them has outside them, confronting them, that object through relation to which the relation between them is established. The essence of their mutual bond is thereby given by a more general system of conditions, a system of interaction, within which they can play most diverse roles (Ilyenkov, 1960, p. 4).

The ‘object’ which in the quote above is the field, is what establishes the relations between these two men and between the men and the object and the more ‘general system of conditions’. These relations are influenced or mediated by their labour power, and the roles and skills and knowledge they apply to the object. As the object changes, through for example ‘the general system of conditions’ such as the changing seasons, or because of the labour
power applied to roles and division of labour and tools (physical tools, tools of knowledge and skills) these aspects or elements of activity will also undergo some form of change. This chapter builds on this concept that the ‘general system of conditions’ mediates activity. The second part of the chapter focuses on the collaborative object and its mediation of collaborative activity.

The term ‘general system of conditions’, is a useful term to describe what is often today referred to as ‘context’ or what Marx referred to as the political economy, referring to the social, political and economic relations of society. Ilyenkov (1960) drew on the work of Marx who claimed that human thought and action are conditioned by the relations of production they interact with. Marx explains that ‘man’ (sic) belongs ‘to a particular social formation, a class, a nation, a historical epoch and is therefore conditioned by the totality of these circumstances in his (sic) mode of behaviour, possibilities, needs and decisions at any given time but it is also ‘man’ who changes circumstances (Fischer, 1968, pp. 155–156). Therefore, in this thesis the term ‘contextual conditions’ is employed as referring to a specific set of conditions, outlined in the following section. These conditions both mediate and are mediated by activity; they are part of the social, political, economic and environmental relations of society.

6.2.1 Contextual Conditions Relevant to the Evolving Marine ICT Cluster

From an analysis of the 2004 Stage 3 data and the literature discussed above, and in Chapter Two, seven contextual conditions that mediate the collaborative activity studied in this thesis, have been identified. The contextual conditions are:

1. Mode of production
2. History
3. Dominant discourses
4. Government policy
5. Industry stages of development
All are interconnected, influencing each other, however, the mode of production sets up relations, possibilities and constraints. History – what has gone before – influences possible trajectories within the mode of production, contributing to discourses, be they hegemonic discourses, institutional, professional or other discourses. Government policy is made within these relations, most often using the language and therefore the possibilities that language shapes, of hegemonic discourses. The infrastructure, topography and resources of a region or state also influence what is possible, as does the stage of development in an industry. As shown in Figure 6.1 institutional arrangements sit at the core of these conditions being the most influenced by each of the conditions listed previously. A layered spiral image is employed to illustrate these interconnections. While the mode of production, history and their dominant discourses influences and shapes the other contextual conditions, so too do these conditions of government policy, infrastructure and resources, stage of industry development and institutional arrangements influence each other. The following brief explanation of each condition refers to some of the literature informing the identification of these conditions. The section providing a more detailed explanation of the conditions draws on the data gathered in 2004.

The mode of production is capitalism. Within capitalism there are multiple modes of production, some are more prevalent in particular industries than others. The Australian information technology industry, for example, has a dominant mode of production which favours contractual arrangements for work. Mode of production refers to both the capitalist mode of production (which is constantly evolving, see for example Gee, Hull and Lankshear, 1996; Victor and Boynton, 1998) and more specific modes of production such as within specific industries. The following quote illustrates the centrality of the mode of production to human consciousness:
The mode of production of material life conditions the social, political and intellectual life process in general. It is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness (Marx and Engels, 1976, p. 503).

A specific example of the influence of the mode of production was discussed in Chapter Two. Keeble et al. (1998) identified an aspect of the mode of production, the movement of labour within a region, as being a factor in developing the flow of information and knowledge creation.

Figure 6.1: Contextual conditions

*History* refers to pathways (Putnam, 1993) created as a result of historical activity. What has gone before sets up possibilities or affordances for future activity. For example, as discussed in Chapter Two, Maskell and Malmberg (1999) identify historical processes as influencing the development of trust in a region. Engeström (1999) lists historicity as a principle of Activity Theory, as discussed in Chapter One. It is necessary to analyse the history of the ideas and tools that have shaped the current activity. Chapter Five discussed some aspects of historical relations between Tasmanian information technology institutions, concluding that there was a history of mistrust between public sector institutions and those representing the private sector.
Hegemonic discourses. Discourses, are the assumptions inherent in social practices. Hegemonic discourses refers to dominant ‘assumptions’, ideologies and practices, necessary for capitalist production in the global marketplace. There are multiple discourses, for example, those that are typical of the ‘new capitalism’ such as managerialism (Gee et al., 1996), industry discourses, professional discourses and discourses specific to a community of practice. Be they hegemonic or other, discourses underpin all tools and mediate objects by contributing to evolving meanings and norms over time. Blackler (1995) identified this when he wrote about knowledge as a mediating and normalising practice.

Industry development refers to the stage of development of an industry. The industry stage of development has implications for industry practices and networks. The Tasmanian information technology industry is a sunrise industry as explained in Chapter Four. The industry’s youthfulness and immaturity had considerable implications for collaboration between the institutions that are the focus of this study.

State, national and/or regional infrastructure and resources is the presence and density of institutions such as universities, research institutions, training organisations, recruitment agencies and industry bodies. Keeble et al. (1998) identify the importance of the presence of such institutions, as discussed in Chapter Two. Multiple research institutions in the state were important in the developing Marine ICT Cluster. The collaborative object was mediated through possibilities perceived as a result of the topography of the state in that the deep-water port of Hobart forms a gateway to the Southern Ocean. Research activity in the Southern Ocean is a focus of the multiple research institutions in and around Hobart, strongly influencing the focus of the collaborative object of the evolving Marine ICT Cluster, as discussed in later chapters. The population size and capacity of a region/state/nation is also part of this contextual condition. As identified in Chapter Four, the small size and
population of the state, characterising it as regional, had implications for what was possible within the state.

_Policy_ refers to government policy, be it state or national policy. Government policy is obviously important in that it has a major influence on state, national and/or regional infrastructure and industry development. These conditions influence each other, creating or limiting pathways of affordances.

_Institutional arrangements_ denote the formal and informal arrangements between institutions. The Oxford Trust, cited in Chapter Two, is an example of where there are strong and well-developed institutional arrangements. Amin and Thrift (1994) and Camagni (1991), also cited in Chapter Two, refer to these arrangements as regional collective learning where there is an exchange of information and the development of trust. As illustrated in Figure 6.1 institutional arrangements sit astride all other contextual conditions, being dependent on all the other conditions, yet also influencing them. For example, as indicated in Chapter Five, the limited institutional arrangements between the Tasmanian information technology institutions are a factor of the early stage of industry development and of the history of mistrust between some of these institutions.

This brief description of each of the contextual conditions is followed by a more detailed explanation of these conditions and their influence in the Tasmanian information technology industry and the evolving Marine ICT Cluster. The explanations commence with institutional arrangements and work out from the image in Figure 6.1 to discourses. History and mode of production are discussed within each of these contextual conditions, as they are so pervasive.
6.2.1.1 INSTITUTIONAL ARRANGEMENTS

Institutional arrangements are important because structured networks between institutions are significant in contributing to information flow, resources and innovation (Porter, 1990; Teece, 1992; OECD, 1999; Flora, 1998; Granovetter, 1973; Gulati, 1999). There are two aspects to institutional arrangements in this case study:

- Limited experience of institutional arrangements between industry institutions such as TasIT, the Department of State Development, Intelligent Island, Industry Council, and the Industry Training Advisory Board, as discussed in Chapter Five
- Institutional policy and practices which restrict collaboration between the institutions and small firms, also discussed in Chapter Five

Each of these is discussed below.

6.2.1.1.1 COLLABORATIVE INSTITUTIONAL ARRANGEMENTS

Chapter Two identified collaborative institutional arrangements as important in the development of innovative regional milieu. Where a range of government, research, recruitment, educational and other institutions have collaborative and/or information exchange arrangements, dialogue leads to common problem-solving heuristics and decision-making routines (Camagni, 1991). Within such arrangements, actors identify patterns of interaction and ways of encoding and decoding information that is meaningful (Osar et al., 1999) to them and to the activity.

A limited history of dialogue influenced opportunities to build, for example, common problem-solving heuristics, decision-making routines (Camagni, 1991) and the ability to identify patterns of interaction and ways of encoding and decoding information as meaningful to each other (Osar et al., 1999). The limited history of collaborative institutional arrangements between the institutions involved in the evolving Marine ICT Cluster was an important factor in the decision by subjects whether or not to continue their participation in the Cluster. A number of these subjects ceased to take part through a combination of not being able to find adequate meaning for them in the object of production as it evolved and the requirements of their own
institutional practices and rules. This is discussed in more detail in Chapters Seven and Eight.

As shown in sub-section 6.2.1.3, Stage of Industry Development, the size and maturity of the Tasmanian information technology industry was one of a number of influences on the limited collaborative arrangements between information technology industry institutions.

6.2.1.2 INSTITUTIONAL POLICIES AND PRACTICES
Institutional policy and practices also influenced relations of production by influencing the object production of the evolving Marine ICT Cluster. Intellectual property clauses in tendering arrangements and insurance requirements of government agencies and research institutions are examples of key institutional policies and practices shaping the relations of production. For example, government tenders often require professional indemnity cover of $10 million, at a cost to firms of $30,000 per annum. These costs are beyond the capacity of small firms. Thus, small firms do not have the opportunity to participate in large tenders unless they are part of a consortium in which there is a medium-to-large firm. Consequently they do not gain the opportunity to lead large projects and gain managerial and collaboration skills and capabilities in this way. Such capabilities potentially contribute to the local industry as these personnel become active in industry institutions.

There were, however, efforts being made in the industry to address these issues. The Elearning software cluster, supported by Intelligent Island, became aware of the ways in which intellectual property and insurance policies and practices were influencing possibilities for collaborative activity for small firms. Specific policies in relation to small firms involved in this software cluster were established by their major customer, the Department of Education. A respondent from the Elearning Cluster noted that:

There was a perception that the Department [of Education] was impenetrable and there was no history of engagement, therefore no previous development of trust, shared language and shared past experience. This is now beginning to be established, partly as a result of recognition by the Department of Education that it does not have to own intellectual property, rather it can have a permanent licence to the product (2002 interview).
Equivalent building of trust, shared language and experience did not exist between those firms interested in the Marine ICT Cluster and the relevant research and government institutions. Institutional practices contribute significantly to perceived possibilities, the distribution of possibilities, knowledge, skills and support. Where institutional policies and practices work against what is possible for small firms they actively contribute to the work of large firms.

As is evident in the following section, there was no consistent government policy to enable the building of trust, shared language and experience between firms and institutions and between industry institutions to build institutional arrangements. Historical experiences continued to strongly influence the trajectory of institutional arrangements in this industry.

6.2.1.2 GOVERNMENT POLICY

Policy reflects hegemonic discourses. As explained in Chapters Four and Five both national and state policies related to the information technology industry focus on innovation and commercialisation. Thus government support is more likely to sustain ideas and applications that reflect dominant, hegemonic discourses within policy and less likely to support that which does not reflect these policy discourses and directions. In addition, it was noted that as policy in relation to clusters was in the process of developing, those outside government circles would have little knowledge of what support was available:

For a cluster, if you were starting off in another area you don’t definitively know what the State government will do to help you get your cluster up (2004 interview)

The assumption within information technology policy that innovation is ‘the driver of every modern economy’ (Chief Scientist, 2000, p. 5) has been evident in the social-economic literature for some time, and is also behind information technology policies in many OECD countries (see e.g. OECD, 1999). Innovation is portrayed in the social-economic literature as a source of competitive advantage (Porter, 1990; Teece, 1992; Tallman and Atchinson,
so product development, dissemination and profit for commercialisation of innovations, is primary. Clusters are one important strategy for enabling the commercialisation of innovations (Bowles and Wilson, 2002).

In this study, institutional subjects made meaning of their activity through the use of terminology such as ‘innovation’, ‘technology’, ‘commercialisation and competition’. These terms were consistently found in descriptions given by respondents relating to the evolving object of production of the Marine ICT Cluster. These terms and the assumption that to achieve one it is necessary to have them all are typical of hegemonic capitalist discourses. Intelligent Island, for example, associated clusters with commercialisation, markets and competition as illustrated in the following:

If government can help in assisting the generation of commercial opportunities then I think it’s a bit like the sort of, let the market be the operator. Because the [name of a growing firm with global markets] has had some major assistance from government, but it’s been driven by the identification of opportunities for that group to harness or to place some new products onto the market that are going to be picked up. Basically speed to market is such an essential thing in these times. Having some dollars to undertake the research and development to develop the rate at which we can respond, is something potentially government can do. But [assisting the Marine ICT Cluster] was always going to be around the identification of their market opportunities (2004 interview).

Intelligent Island supported the firm referred to in the above quote because they had a product for commercialisation and were cognisant of international markets. The Marine ICT Cluster was not supported in a similar way, as, at the time of its inception, a different funding program was being applied.

The research institutions were also well aware of the policy emphasis on commercialisation. One respondent, who knew of work on a product that had been done already within his institution, commented that the Marine ICT Cluster offered a possible opportunity:

So my thought was…we’ve got a model that works superbly, we’ve done all the ground work on commercialisation and merchandising, why not take that model and through this medium and as one of the members of this Cluster, develop that model and apply it to other institutions. That was my other interest [in the Marine ICT Cluster] (2004 interview).
Formal policies targeting information technology industry development and innovation at the state level (the programs identified in Chapter Five) valued commercialisation and, therefore, the ‘need’ for a market for the intellectual property being commercialised as indicated in the following quote:

Well [Department of State Development] view was I suppose, even though because I wanted to form a cluster as well but I thought the feasibility was – I couldn’t understand why you’d form a cluster if there’s no market to form a cluster to service. So the [Cluster Steering Committee] were determined to form a cluster. I kept thinking well if there’s no market there why would we assist, even though they could still go ahead and still form a cluster, but for us, in terms of industry development, I find it pretty hard to justify State Government money going into the fact that 10 firms wanted to form a cluster for no real outcome. Like we’re about business growth and employment and so unless we could see some business growth or employment that would be just a business decision those businesses made (2004 interview).

The Department of State Development placed great emphasis on having a ready market. This emphasis was not shared by the Cluster Steering Committee. They had different assumptions about the role and purpose of clusters; this is examined in Chapter Seven.

Government policies and procedures around the practice of tendering work in such a way that large tenders are ‘more interesting and important’ (2004 interview) influenced another respondent in perceiving the Cluster as an important opportunity. As the quote below illustrates, this respondent’s motive for being part of the collaborative arrangements in the evolving Marine ICT Cluster was essentially to increase competitive power and to gain more interesting projects:

If it works then what [the firm] gets are larger projects…With the [Marine ICT] Cluster we see that we could be involved in jobs that are worth $3 to $5 million a year as a group. That brings us to a different layer where we move away from a whole lot of competition with smaller companies and we start to be in with the likes of [name of national firm] that employ 100 or more staff, they are in a different band. The band we are in at the moment, government is happy enough to work with for small jobs that are not very important. The band we want to get into is where government and the private sector say, these people have something we need or have a way of servicing us over time (2004 interview).

Linkages between science and technology firms and research institutions are critical within capitalist relations of production; critical because the research

\footnote{Formal in that they were written, as opposed to ‘carried inside someone’s head’ as noted by one respondent.}
institutions are a major source of commercialisable products for the global market. Although policy supported commercialisation of intellectual property into global markets, there were no established institutional arrangements in place to aid this process. Policy tended not to support the developing of institutional arrangements. There was a need for policy development to assist this young sunrise industry.

6.2.1.3 Stage of Industry Development

There are two aspects to stages of industry development: the size of firms in the state industry (related closely to the mode of production) and the maturity of the industry. Both impact on the skills and competencies in the industry and, therefore, what is possible. As mentioned in the sub-section on institutional arrangements, the stage of industry development has major implications for institutional arrangements.

As explained in Chapter Four, the Tasmanian information technology industry is small and is largely made up of micro firms of owner-operators or firms employing fewer than five people. There are only a small number of medium enterprises and no large information technology firms (firms employing 100 or more employees) in the state. An industry consisting mainly of micro firms and a very small number of companies with knowledge and experience of global markets has consequences for what is possible. Small firms do not have the same credibility, business, management, marketing skills or networks that medium or large firms have, as indicated in the explication of institutional arrangements.

This has implications for what is produced, how it is produced, what tools are used and who consumes them. Small firms do not necessarily have the experience and skills to consume or use tools, such as writing tender documents, collaboration, marketing and distribution skills, as effectively as larger firms. For example, respondents interviewed for this thesis, both in 2002 and 2004, perceived that business skills were an issue in the state, that ‘the people that drive [small firms] are racing around like whirly gaggies with
not enough time’ (2002, interview) to identify skill sets and/or work out how to access the skills required. This includes the distribution of market opportunities and opportunities for collaboration. As the respondent below points out, small firms do not have the same access to the range of possible partners at a global level as do large companies:

Getting access to the type of partners who can distribute, deliver, support, manage their product on a global scale because there’s no way [name of small company] can do it from Hobart, and there’s no way they can gear up to do it…clients for [Name of large company] product are companies that are 10,000 employees or more, sort of companies, big companies, and they are a little company and what they really need is intermediary delivery arms that actually deliver a product for them (2004 interview).

Policy that supports ways of assisting small companies to operate and compete in a global market would help the industry mature.

In a young, small industry the distribution and depth of skills is not as well developed as in a mature industry that includes large companies, or an industry supported and structured in a way that enables small firms to work with institutional customers. In the Elearning Cluster working with institutional customers has led to some of these companies accessing a range of markets, including international markets through contacts with their institutional customer, the Department of Education. This has implications for the skills the information technology industry institutions have access to, particularly TasIT as discussed in Chapter Five. The size of the industry and its constituents influences what tools are distributed and used by and within the industry and in and across its institutions. Therefore, it is not surprising that all respondents reported that the Marine ICT Cluster could not have been initiated five years earlier. The industry was not yet mature enough. Well-developed, supportive institutional arrangements have the potential to assist a young industry develop and mature.

In 2002 all respondents described the industry as immature and/or politically naïve, with little knowledge of how to trust each other, be it trust between firms, or trust between information technology institutions. In addition, there were only a small number of firms in the Marine ICT arena, as this respondent explains:
The industry was just so young [in the 1990s] and there weren’t enough players. As a result of…functions [organised by the institutions] there’s been a great deal of knowledge and trust. One of the things that happened in 1998 when I joined the Committee of [name of industry institution] was there were people not wanting to join because: ‘he’s my rival and I don’t trust the so and so’ and ‘I won’t be able to work in [name of institution] if he’s there’. Now these people are getting together and having contracts together with people on the mainland. So there is a lot of change in the way in which the relationships are formed. There’s much more trust and there’s much more commonality of purpose in the industry than there was before, instead of a whole lot of start up companies looking over their shoulder to see who is out to knife them. They’re not doing that now they’re starting to find ways to work together (2002 interview).

This respondent notes that there has been growth and development and a maturing process in the industry, but also notes in the same interview that the industry is immature, and does not compare to the information technology industry in other eastern mainland states. This is evident, for example, in the quotes below where two different respondents suggest that in 2002 that there was limited experience within the Tasmanian information technology industry of those who had interacted with government in relation to policy development and that the industry was naive politically:

We have people who have only ever interacted with government once and have absolutely no idea how it works, who you lobby, who you talk to…Its almost at the level where the whole idea of representing the industry and representing to government is still being moved around amongst us, that’s still being adopted…The idea that [members] might be thinking about how businesses grow or that they might have an opinion about what a government policy is, is still for people here relatively new…There’s one example that I can think of that people are starting to say, oh we can do this, we can get involved and it’s actually legitimate for us to be involved (2002 interview).

When it comes to debating hot issues…the industry is immature…People are [just] realising that it is possible to go out there and be political with a small p in the way that your industry bodies operate rather than being turned back into themselves…The idea that we’re actually in a position to stimulate debate amongst ourselves is a bit scary (2002 interview).

The structure of institutional arrangements discussed in Chapter Five where there are no industry representatives on government information technology institutions does not support development of industry institutions and their interaction.

Another factor limiting industry capability is the difficulty in attracting those with a greater depth of experience from outside the state:

The sort of level that we have our most senior chief information officers in is in the big agencies, like education and health… Its about $100,000 lower in salary than people in other states to do that same sort of job. This would be
acceptable to Tasmanians but you could never recruit anybody from outside the State to take that job on (2002 interview).

Differences in comparable salaries and the ability to attract skilled and experienced personnel is a factor for many professions in regional areas. The industry was impeded in its perception of needs and in initiating activity that might improve relations of production within the industry. The youthfulness of the industry influenced the skills and capabilities available for the evolving Marine ICT Cluster.

6.2.1.4 Infrastructure and Resources

The number of research institutions in the state was the critical factor in determining the focus of the object of production of the Cluster around marine science. The following quote identifies some of these institutions and their potential for the evolving Cluster:

[The Cluster Steering Committee] recognised some rather important things about Hobart. Hobart has Commonwealth Scientific Industrial Research Organisation (CSIRO) Marine Research, Australian Antarctic Division (AAD), the Australian CRC. So all of these things are big bucks. You have to understand that the AAD depending on how you count it is $70–$80 million operating budget per year. CSIRO Marine Research is something like $30–$40 million per year and ACRC a paltry $3 million per year. So it was quite a bit of money in these areas. Then there’s the National Ocean’s Office which is another $4–5 million per year. Hobart has the second highest density of scientists in Australia and is the biggest centre of marine activity in Australia and in fact that includes the whole of the Southern Hemisphere. Hobart is the gateway [to the Southern Ocean] and a whole lot of things that have a certain synergy (2004 interview).

This critical mass of research institutions and the size of their budgets was an important factor in the evolving object of production and therefore in how the object mediated the collaborative activity of the evolving Cluster. It impacted on what subjects were approached to be part of the developing Cluster thus mediating relations between them and the tools they brought with them. The presence of these research institutions also mediated the distribution of tools and practices the collaborative activity potentially had access to. This is explored in detail in Chapter Seven.

Topography and the resources it affords, such as the deep-water port of Hobart and its proximity to the Southern Ocean, influences possibilities. The
presence of multiple research institutions around the theme of marine science provided an important motive for the evolving Marine ICT Cluster. Government policies, both State and Commonwealth, have supported the location and development of these research institutions. Movement of personnel out of these institutions into the Tasmanian information technology industry as entrepreneurs, with funding assistance from Intelligent Island led to the growth and development of a small number of medium-sized firms in the industry, thus assisting the industry’s growth. Movement of personnel, as identified in the literature on regional milieux in Chapter Two is reflective of a region’s or industry’s mode of production.

6.2.1.5 Hegemonic Discourses

Discourses are a social practice. There is a dialectical relationship between a ‘discursive event’ and what comprises it (Wodak, 1996, p. 15). Lektorsky (1980, p. 127) states that knowledge is not static or necessarily certain, but has referential meanings and norms which are constantly evolving. Referential meanings and norms are influenced by context, particularly by hegemonic discourses but are contextualised within different settings. As explained in Chapter Three, analysing documents and interview data for assumptions and norms operating in each institution and across institutions formed part of the data analysis process. These findings are analysed in the following chapters.

Assumptions and norms evident in policy documents (e.g. Framework for the Future, 2003a; NOIE, 2003: Department of Economic Development) and in dialogue with respondents include:

- Commercialisation of intellectual property – whether it is produced in the public or private domain
- Innovation equals science and technology (not education, health and community services for example)
- Information economies require access to Intellectual Property and access to global markets. This assumes knowledge as a commodity
- Clusters equal economic growth, jobs and access to global markets
These assumptions were shared by all institutional subjects in the Cluster Group, although some subjects placed greater emphasis on, for example, clusters equalling economic growth, jobs and access to global markets, than others. These assumptions, held in common, influenced what subjects initially took part in the developing Marine ICT Cluster. Subjects viewed the idea of a cluster as an opportunity to use information technology intellectual property to grow their firm, or commercialise intellectual property or assist in the development and application of the ideas inherent in these assumptions. The ways in which these assumptions were held by all those subjects taking part in the evolving Marine ICT Cluster are discussed here. In Chapter Seven other assumptions are discussed that focus on differences rather than what was held in common.

Commercialisation of intellectual property is an assumption held in common by all institutional subjects. For example, one respondent spoke passionately about the intellectual property locked up in his institution. He argued that the institutional bureaucracy ‘is there to protect and manage it, to ensure the intellectual property is there for today’s generation and future generations’ and can the caretakers of this intellectual property release it for gain into the community?’ This respondent argued that such intellectual property should be commercialised and profits returned to the institution. Participants who were approached and responded positively to being part of the Cluster held the belief that intellectual property is that which can or should be commercialised.

Further, commercialising intellectual property was perceived as fundamental to participating in the information economy and was linked to the need to access global markets. For example, several respondents identified a particular enterprise as successful because the enterprise had exported its software products to institutions around the world including the USA, Japan, the UK and Europe (http://www.sonardata.com). This construction of success was to become an important aspect of how institutions such as the
Department of State Development and Intelligent Island assessed the potential success of the emerging Marine ICT Cluster and is discussed in more detail in Chapter Seven.

In addition, the commercialisation of intellectual property is a requirement of Commonwealth policy funding arrangements for research institutions and therefore, commercialisation of intellectual property is part of the motive or object of activity of these institutions. One respondent from a firm identifies the opportunities afforded by the intellectual property of the research institutions:

Much intellectual property has no commercial value and therefore it has zero value and of course it’s completely useless until you commercialise it. So we should be getting notoriety as much as we can because the way the research funds have come from the [name of institution] is related to our successes so our success can sell for one dollar but they make a few million dollar organisation or a $10 million organisation then we’ll get more money, because they’ll understand that we’re doing something (2004 interview).

That what is produced in the public domain by public monies can be put on the market for private or public profit and that innovation equals science and technology were ideas and beliefs deeply embedded in the language of respondents. All spoke of the need for the commercialisation of intellectual property and of the need for access to markets albeit with different emphasis. These hegemonic discourses are reflected in both national and state policies. Like information, communication and technology policy in many OECD countries Australian information, communication and technology policy works with the assumption that the market is the organising factor. The link between information technology, the information economy, innovation, competition and global markets is deeply embedded in policy directions and is an assumption that policy makers work with.

Hegemonic discourses are informed by the mode of production and history. The discourses discussed above are typical discourses of capitalism and inform government policy. Policy and the hegemonic discourses shape possibilities for industry development and institutional arrangements, as well
as the development of infrastructure and resources and the ways in which they are used.

But what of these contextual conditions? The above section has explicated, in general terms, how contextual conditions are not only integral to the collaborative activity of the evolving Marine ICT Cluster, but also indicated ways in which these contextual conditions mediate that activity.

As the concept of mediation is an important one to the conceptualisation of collaborative activity in this thesis, it is examined here. Historically the concept of mediation, as used in this thesis, comes from the work of Vygotsky in the 1920s, who argued that human action is mediated by culturally meaningful tools and signs. Vygotsky argues that the mediation of human action through signs and tools enable the human being to control him-or herself from the outside, to regulate our interactions with the world (Vygotsky in Engeström, 1999, p.29). A recent activity theoretical scholar, Lekortsky (1999, p.66) explains Vygotsky’s concept of mediation as ‘human beings create stimuli that determine their own reactions and are used as means for mastering their own behaviour.’ Wertsch (1995) takes this concept and further develops it, providing ten claims about mediated action. Table 6.1 lists these claims and provides an explanation of how each claim contributes to an understanding of mediation.

Although Wertsch’s 10 claims are claims in relation to mediated action, that is, action of the subject as they use tools to achieve multiple goals, the following ideas are key to an understanding of mediation as used in this thesis:

- Just as tools provide affordances and constraints, so do contextual conditions provide affordances and constraints
- Just as subjects appropriate and master the cultural, historical and institutional patterns of tools, so do they appropriate and master the cultural historical and institutional patterns of contextual conditions
- Contextual conditions provide affordances and constraints for access to tools and the consumption of tools
- Contextual conditions are dynamic, have within them their negation, that is, there are dialectical tensions within contextual conditions

### Table 6.1: Ways in which Wertsch’s 10 claims add to an understanding of mediation

<table>
<thead>
<tr>
<th>Claim</th>
<th>Contribution to what is meant by mediation for this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Relations between the agent or subject and the tools they use is dynamic, there is a dialectical tension between these elements</td>
</tr>
<tr>
<td>2.</td>
<td>Cultural tools exist across time and space</td>
</tr>
<tr>
<td>3.</td>
<td>Action through mediational means has multiple goals. Because relations between the subject and the tools they use is dynamic and there is dialectical tension, there is often conflict between the multiple goals the action is intended to achieve</td>
</tr>
<tr>
<td>4.</td>
<td>Historical precedent is embedded within the tools we use, and these mediate our conceptualisation of skills and intelligence</td>
</tr>
<tr>
<td>5.</td>
<td>The tools used and the relationship between the tool(s) and the subject influence not only what the subject perceives as possible and not possible, but, because the tool(s) are historically situated, what the situated context allows.</td>
</tr>
<tr>
<td>6.</td>
<td>New tools inform, influence and shape the organisation of labour, that is, access to tools, the distribution of tasks, the consumption of tools, including skills and knowledge</td>
</tr>
<tr>
<td>7.</td>
<td>Embedded within tools are their historical, cultural and institutional patterns. When subjects master tools these patterns are learnt, but not necessarily valued or internalised.</td>
</tr>
<tr>
<td>8.</td>
<td>In mastery of tools, subjects ‘learn’ the historical, cultural and institutional patterns without internalising them. Whereas when subjects appropriate tools they internalise the historical, cultural and institutional patterns. That is, subjects value and believe in the patterns, consciously or unconsciously.</td>
</tr>
<tr>
<td>9.</td>
<td>When tools are used and appropriated without conscious thought, there is no awareness of the ways in which they inform and influence the perception of possibilities and constraints</td>
</tr>
</tbody>
</table>
Mediation is a complex process with multiple dimensions. In this thesis it is acknowledged that mediation is inherent in the social relations of production, as discussed in Chapter two. It is necessary to appreciate that mediation is integral to social relations of production. For example, exchange is mediated by the culture and structure of the community, by the skill sets within the community. Distribution of rules and power and division of tasks mediate access to tools and who consumes them and how they are consumed and for what purposes.

Thus contextual conditions mediate collaborative activity in ways discussed in this Chapter and developed further in the following Chapters.

6.3 Collaborative Activity and the Object

Engeström (2004, p. 18) states it is necessary to ‘follow the objects’ over time and space to understand learning in interacting activity systems, that is, in collaborative activity. It is argued here that the object both reflects and responds to contextual conditions. This section commences with a reminder of the object of activity of single, activity systems with established practices, explained in Chapter One.

In Chapter One activity systems were described as having a collective motive, that is, activity meets a need which is not static but constantly evolving. Objects of activity determine the horizon of possible goals and actions, and are constantly constructed and reconstructed, as intermediate goals are reached. The object of activity is a ‘moving target’; it is not a static state or place to aim for, but is constantly changing in response to actions. Lektorsky
(1984) explains that ‘mediating objects’ are embedded with the history of activity as cognised by those who use them:

In the objects cognized, man singles out those properties that prove to be essential for developing social practice, and that becomes possible precisely with the aid of mediating objects carrying in themselves reified socio-historical experiences of practical and cognitive activity (Lektorsky, 1984, p. 137).

As meaning is made, it influences the trajectory of the object of activity and of production and the development of social practices. Contextual conditions influence the meaning as perceived by the subject. Knowledge cannot be isolated from context (Blackler, 1995) (or, as argued in this thesis, contextual conditions), power relations, language and discourses. The formulation of the objects of activity and production is, in part, through the tools of language, text and practices that constantly jostle, creating disturbances and tensions (Lotman, 1990) adding to the complexity and learning needs in activity at the boundary over time. There is a considerable literature on activity at the ‘boundary’. This literature includes Fleming and Spicer (2004), Kerosuo and Engeström (2003), Hernes (2004), Fitzpatrick’s (2000) use of metaphor of collaborating organisations working at their edges, Lotman’s (1990) use of semiotic spaces and the concept of peripheries and centres from the community of practice literature (Wenger, 1998; Lave, 1996). This literature suggests that the ‘boundary space’ is a site of tension and disturbances with different languages and practices which also contribute to creating multiple ‘boundary spaces’. The ‘boundary space’ is structured and constantly restructured over time as contextual conditions influence and interact with the evolving collaborative activity. Contextual conditions are intrinsic to this dynamic, constantly evolving process.

But how is the object formulated in collaborative activity at the boundary, where there is rapid change? In collaborative activity there are multiple needs from multiple systems of activity. The object of the collaborative activity is formulated through the object of multiple systems of activity. What follows is an explanation of Engeström’s (2001) depiction of interacting activity
systems and how this relates to collaborative activity of the case study in this thesis.

In Figure 6.2, sourced from Engeström (2001) illustrates how what he terms as interacting activity systems work together through their objects and the jointly constructed object. Figure 6.2 is a minimal representation of what may be numerous interacting systems in which there will be multiple tensions and contradictions. Object 1 is the subject’s construction of the object of each activity system involved in the interaction. Object 2 is the collectively constructed object of each activity system, for the purposes of interaction or collaborative activity. And Object 3 is the overlapping, potentially shared or jointly constructed object within the collaborative activity. As with the object of each of the activity systems taking part in the collaborative activity, this object is constantly evolving and changing.

**Figure 6.2: Interacting activity systems**

![Diagram of interacting activity systems](image)

*Source: Engeström (2001, p. 136)*

The concept of an overlapping or potentially shared object is an important one. In the Marine ICT Cluster there was an assumption that all institutions that took part did so to meet a perceived need to develop a sustainable industry. The overlap for the three institutions in this case study then is sustainable industry development. As indicated in Table 6.1, each institution had a similar but different object of activity, and various goals to achieve this
activity. The table uses Leont’ev’s (1978) levels of activity – object and action – goal to illustrate differences and similarities.

<table>
<thead>
<tr>
<th></th>
<th>Collaborative object of activity</th>
<th>Object-oriented activity</th>
<th>Goal-oriented action</th>
</tr>
</thead>
</table>
| TasIT                |                                   | Industry potential       | Collaboration between industry partners  
Encourage opportunities for local firms to win large projects  
Keep state government work within the state |
| Intelligent Island   | Sustainable industry development  | Industry development     | Develop good networking and entrepreneurial skills  
Encourage export of products and services  
Creation of commercial opportunities |
| Department of State Development | Industry development | Multiple approaches e.g.  
○ Technopark  
○ New start-ups  
○ Commercialisation manager for University research  
○ Test the role of government in cluster development |
involved they were cognisant of the possibilities clusters offered, but had not yet developed any policies in relation to the role of government in assisting cluster development in any industry. The evolving Marine ICT Cluster was considered to be a golden opportunity to test what role they might play.

Intelligent Island’s object oriented activity is also industry development. One of the goals of this institution is the creation of commercial and export opportunities. Intelligent Island perceived the Cluster as meeting its need to develop industry, as clusters are often considered as excellent commercial opportunities with export potential. TasIT’s object oriented activity of industry potential and their goal of collaboration between industry partners to gain larger projects, and keep work within the State are also ways of developing a sustainable industry.

The TasIT goals are partially captured in the following reflection of a respondent on their intentions in developing the Cluster:

We were trying to put up another model another area for funding [to the Bioinformatics Centre]. Now obviously the way we’ve gone about it we didn’t get ourselves the funding that we thought was available. But we have gone ahead and done it anyway just to get members of TasIT involved… [The Cluster] provides us with the clout to go against the bigger [Tasmanian] companies and bigger mainland companies. Depending on who is in, there are 40 or so skilled people who you can bring to a project through the project whereas probably the most that we could get would be 10 or 12 from one company. And there’s strength and there’s diversity and there’s managerial skills and there’s a whole range of project management and technical skills in terms of hardware and software (2004 interview).

The Cluster, from the perspective of TasIT, offered multiple possibilities for small Tasmanian firms. Initially it was put forward as an alternative to the Intelligent Island’s proposal for a Bioinformatics Centre of Excellence, discussed in Chapter Five.

The overlapping object of collaborative activity generates the ‘boundary space’ of collaborative activity.
6.3.1 The ‘Boundary Space’ of Collaborative Activity

As Fitzpatrick (2000, p. 119) notes, boundary arouses the image of a relatively stable, fixed-edge condition; however, boundary is depicted as a fluid, constantly changing condition. Boundary both separates and unites, belonging to both what it separates and unites; boundaries filter and adapt (Lotman, 1990). Hernes (2004) points out that boundaries differentiate, that they are constantly subject to construction and reconstruction. Boundaries are fluid, dynamic and flexible over time and space (Fitzpatrick, 2000, p. 124). Boundaries are multiple, permeable and filter practices (Lotman, 1990). Lotman (1990) suggests there are multiple boundaries at different levels; there may be discrete areas marked off and/or these may be part of a more general space, one side of which is demarcated by a fragment of a boundary, while the other is open. These spaces are multiple and dynamic, gradually becoming ‘structured’ (p. 148) as there is movement towards a centre enabled through ‘translation into one’s own language’ (p. 148). Engeström (2004) posits that spaces and infrastructures for learning are created when new forms of practice evolve, when there is constant movement, when there are actions of bridging, boundary crossing, negotiation, exchange and trading, movement across and through spaces, stabilisation and destabilisation.

Therefore rather than boundaries or edges, it is more appropriate to use a term such as ‘boundary space’ to describe what takes place when institutions work with others, blurring the ‘edge’ between their own activity and that of the collaborative activity. In the ‘boundary space’ there is tension, a sense of ‘us’ and ‘them’, jostling of what is important and not so important in the hierarchy of meaning, creating multiple ‘boundary spaces’. Different encoding methods, informed by cultural schema, referred to by Gee (1999, p. 43) as ‘discourse models’ are evident in different practices, as will be shown in Chapter Seven. Contextual conditions, particularly hegemonic discourses, are embedded in the texts, dialogue and (the language) and tools of the ‘boundary space’. There are multiple spaces in the ‘boundary space’; boundaries are
fluid, their permeability changes constantly, structuring and restructuring the ‘boundary space’.

6.4 Conclusion

The conceptual framework developed in this chapter identifies contextual conditions relevant to the collaborative activity that is the focus of analysis in this thesis, the evolving Marine ICT Cluster. The contextual conditions, as illustrated in Figure 6.1, of mode of production, history, hegemonic discourses, industry development, infrastructure and resources, policy and institutional arrangements are interrelated and interconnected, but for the purposes of discussion have been, and in following chapters will be, identified individually. This chapter has illustrated that they are present in the Tasmanian information technology industry. To some extent this chapter has shown how contextual conditions are present in the collaborative activity of the evolving Marine ICT Cluster. In the following chapter the ways in which these contextual conditions influence collaborative activity, will be revealed.

In this chapter it was posited that collaborative activity takes place in the space at the boundaries of each institution that are taking part in collaborative activity, that is, collaborative activity takes place in the ‘boundary space’. This ‘boundary space’ consists of multiple spaces and layers created by overlapping and focusing objects within the collaborative object. Tensions and disturbances create further spaces as different practices, tensions and contradictions interact in the process of collaborative activity. The ‘boundary space’ is structured and constantly restructured over time as contextual conditions influence and interact with the evolving collaborative activity. The ways in which this occurs and how contextual conditions influence this collaborative activity, are at the heart of the next chapter.
THE WAYS IN WHICH CONTEXTUAL CONDITIONS INFLUENCE COLLABORATIVE ACTIVITY

7.1 INTRODUCTION

Contextual conditions relevant to the case study in this thesis are mode of production, history, hegemonic discourses, policy, industry development, infrastructure and resources and institutional arrangements. As argued in Chapter Six the interaction of contextual conditions influences possibilities and constraints. Data collected in interviews by asking questions aimed at eliciting the object of activity and of oproduction, and through analysing textual data, such as minutes and proposals is used in this chapter to address
the third research question: *in what ways do contextual conditions influence collaborative activity?*

The chapter commences with an analysis of the object of production – as discussed in Chapter two – of the evolving Marine ICT Cluster. The object of production differs from the object of collaborative activity in that the collaborative object is the presupposition for production. The object of production is the object produced for consumption. As will be shown, the evolution of the object is influenced by contextual conditions. Collaborative activity is mediated by contextual conditions not only through the object, but also in other ways as claimed in this chapter. An examination of the use of language, a major tool of collaborative activity and its mediation of the collaborative activity of the evolving Marine ICT Cluster is followed by an analysis of other aspects of the collaborative activity of the evolving Cluster.

**7.2 THE EVOLVING OBJECT OF INSTITUTIONAL COLLABORATION IN THE DEVELOPING MARINE ICT CLUSTER**

Of necessity, the object of production in collaborative activity will change rapidly compared to change in established organisations. From the minutes and papers produced by the Cluster Steering Committee it was possible to map the evolving object of production, pinpointing its historical trajectory at a point in time, as shown in Table 7.1.

The object of production had a number of formulations, changing as different tools elicited different information and meaning and different contextual conditions within each institution became evident.

**7.2.1 OBJECT OF PRODUCTION A**
The idea of the Cluster first emerged at a conference attended by a TasIT member through discussions with a participant who had been involved in a Cluster.

Object of production A was in part a response to Intelligent Island’s proposed $20 million Bioinformatics Centre of Excellence. TasIT had been unable to convince Intelligent Island that a viable alternative would be a marine science/Southern Oceans focus:

We were looking at the alternatives to bioinformatics as a possibility (mainly because they couldn’t even work out what the definition of bioinformatics was) that the bioinformatics might shut down, which it did. We suggested perhaps looking at the fact that we have all the science organisations operating in Hobart to the extent that there’s more marine scientists operating in Hobart per head of population than anywhere else in Australia (2004 interview).

The object of production for TasIT was always to develop a Cluster. As is evident from the quote above, the presence of a large number of research institutions working in the area of marine science and Southern Ocean studies influenced the focus of the Cluster. The motive of TasIT subjects centred on the idea that a Cluster would be well-positioned to take advantage of the intellectual property from these research institutions thus enabling small firms in the state to grow and work collaboratively in large projects. The object of production is also influenced by the contextual conditions of industry development and the resulting relations of production for the

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Object of production A</th>
<th>An Information Technology Cluster involving GIS, Antarctic, Southern Oceans, Fisheries, Oceanography Studies as an alternative to the Intelligent Island Bioinformatics Centre of Excellence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-2002</td>
<td>Object of production B</td>
<td>A Science/Information, Communications Technology Industry Cluster</td>
</tr>
<tr>
<td>Late 2002–2003</td>
<td>Object of production C</td>
<td>Marine Science Information, Communications Technology Cluster</td>
</tr>
<tr>
<td>May 2003</td>
<td>Object of production D</td>
<td>Need for control Trading Cooperative to build on the information technology skills and Intellectual Property generated in Tasmanian Scientific Institutions</td>
</tr>
<tr>
<td>March 2004</td>
<td>Object of production E</td>
<td>To be the leader in the adaptation and commercialisation of ICT-related intellectual property generated within the Tasmanian marine science community, in other local scientific institutions and in the ICT private industry.</td>
</tr>
</tbody>
</table>
industry. That is, the small size of firms in the industry was a factor in mainland firms gaining larger state projects over local firms. As the motive at this point was to clarify the idea, much of this work was undertaken by TasIT.

7.2.2 Object of Production B

This phase commenced with the inaugural meeting of the Cluster Steering Committee, open to those who expressed interest. The inclusion of others occurred over a period of many months. Firms taking part in the Steering Committee saw value in the Cluster to meet their own object activity of business expansion for profit as expected hoped for by the initiators. The widening net of subjects involved, such as the research institutions, and Intelligent Island were not only an outcome of networking activity, but of contextual conditions such as the need to compete against larger mainland firms for local tenders, infrastructure and resources, and the presence of these research institutions in Hobart.

During the time Object of production B was the focus of interaction a champion emerged who was interested in developing the information technology industry in the southern region of the state. He was in a position to provide credibility and assist in extending the networks, particularly to the research institutions. Access to and inclusion of the research institutions was important, as dominant ideas about cluster development in relation to information technology and innovation put the focus on intellectual property and considerable intellectual property is developed by research institutions. Contextual conditions of the number of research institutions present in the south of the state, the discourse of innovation, information technology and clusters influenced the of production and the search for appropriate subjects.

At the inaugural meeting of the Cluster Steering Committee a proposal, entitled ‘Developing a Business Proposal for the Cluster’ was presented by TasIT, exploring the concept of geographic clusters for industry development around scientific endeavour, their relevance to the state, possible aims for
such a cluster and outlining some next steps in implementing a Cluster. A model format for seeking funding in the order initially of $150,000 and later of up to $5 million was put forward as part of this tool. This latter amount is one quarter of the funding for the Intelligent Island proposal for a Bioinformatics Centre and is well within funding of clusters internationally. Aspects of the proposal encapsulated or were responses to contextual conditions referred to in Object of production A such as policy in the form of the Intelligent Island programs and national and international interest in the clusters. The proposal was a tool used by the Cluster Steering Committee, mediating the work of the subjects, towards achieving their object of production of establishing a Cluster. There was an expectation within this tool that funding would be accessible. This was in part, a reflection, as perceived by the Cluster Steering Committee, of the policy environment of the $40 million funds of Intelligent Island. Such expectations mediated relations between subjects and the object of production itself, contributing towards Object of production D, as discussed below.

7.2.3 Object of production C

By this time, the object of production had evolved to a Marine Science Information, Communications Technology Cluster. Some six months after the inaugural meeting the Cluster Steering Committee had expanded to include individuals from a number of research institutions, who participated as individuals, not as representatives of those institutions and also a representative of the Intelligent Island and a different person from the Department of State Development. The Department of State Development and Intelligent Island were important subjects at this time, as the Cluster Group had reached the point where these subjects assisted the Steering Committee to hold a workshop to develop a common understanding of the opportunities that existed and identify potential commercial outcomes and to apply for funding to do this. Rather than hand the funding for the workshop (some $30,000) over to the Cluster Steering Committee, the Department of State Development managed the workshop itself, providing professional facilitation and encouragement.
The workshop, attended by some 70 people, decided that a survey of the industry and possible market opportunities was required. The funding and management of the survey was also controlled by the Department of State Development; it held the funds, tendered out the project and managed the project. The survey was a tool distributed asymmetrically; power and exchange were governed by the Department of State Development. There were a number of stated reasons for this. One was the policy to tender for projects over $10,000; another was related to the Department of State Development policy of not handing funds to specific firms – unlike the Intelligent Island Program which supported applications from firms until that particular funding program was depleted of funds.

The evolving object of production of the Cluster Steering Committee reflected the goal of Department of State Development to test cluster development. The object of production of the Cluster Steering Committee had a ‘characteristic’ (Ilyenkov, 1960, p. 5) that the Department of State Development did not and could not possess (namely an organically formed group that wanted to develop a cluster). For the Department of State Development the evolving cluster was a tool, through which they could achieve their goal of testing the role of government in cluster development.

During the time of Objects B and C there was considerable movement of subjects in and of the Cluster Steering Committee. For some of the research institutions, the Department of State Development and Intelligent Island, one of their frustrations is evident in the minutes of the Cluster Steering Committee. Examples of opportunities for development of commercialisation projects from research were consistently reported. One such being a device used in Antarctic waters for capturing density and temperature. The device sunk then rose to the surface having collected the necessary data, and then activated a signal which allowed scientists to locate it. These possibilities were not taken up by the Cluster Steering Committee. What is also not in the
minutes, nor did any respondent mention it, is discussion of how and where funding for such commercialisation possibilities would be sourced. The inaugural members of the Steering Committee had assumed originally in their proposal that access to funding for commercialisation of possibilities would be possible. By this time they had realised such funding would not be accessible, as they had expected it would be. This suggests that at this time the dominant voice in the Cluster Steering Committee was that of TasIT and therefore their conception of cluster was asserted.

7.2.4 Objects D and E

During the time of Object of production D, various position papers had been prepared and discussed. These position papers centred on possibilities for membership, legal, financial and governance arrangements for a Cluster. These position papers were key in mediating movement towards developing the structure of the Cluster. An important enabling tool used to support the development of the position papers included the Tasmanian Cooperatives Act 1999. The selection of tools and the final position papers reflected values of cooperative endeavour.

The decision to form a trading cooperative expressed an important set of principles, namely democratic decision making and equal opportunities for all members. Clusters are most often formed as loose associations, an incorporated body or a company. These possibilities were rejected by the Cluster Steering Committee for reasons identified below. Contextual conditions such as an existing Act (an example of policy), and the experience of having seen a company structure disadvantage small firms (an example of the mode of production of industry development) influenced the selection of tools and decision making as cooperative. One member described the rationale for a trading cooperative in this way:

I wouldn’t have gone into it, if it had been a company structure…because 5 shares in a 100 is no interest, to gain influence you have to form alliances and parties umpteen factions and form sort of political interest. I think one the things that the Cooperative did was not only made it democratic, it depoliticised it…Most associations in the commercial world are small groups
of people who get together and run it and there is no democracy I don’t feel engaged by it and I think that’s what associations are about, other than the Committee, the engagement factor is very low. We could have done it as a company, but a company doesn’t expand and contract as easily. A company has two problems one it doesn’t grow easily because every time you grow you dilute your influence away, obviously as you grow the Cooperative your influence goes as well but the company can also be bought up, can be traded so I can sell you my shares or half my shares and you buy half the shares off every other member of the company so you end up 45 or 55% of the Company which effectively means basically you go home you do as you are told or you have control. That I don’t think is sustainable (2004 interview).

A combination of dynamics mediated relations in the Cluster Steering Committee to change their object of production to one that focused on developing a structure for the Cluster. Respondents from TasIT had always wanted to develop a cluster; for them this meant developing a strategic entity that was ready to respond to possibilities. There were also issues around the survey which had taken far longer than the timeframe agreed upon. The survey was pronounced by all respondents as a poor-quality piece of work. The firm contracted to conduct the survey had not consulted adequately with industry or the Cluster Steering Committee, the data they collected was inadequate, not meeting the needs of the Committee. By this time, it was also very clear to the Cluster Steering Committee that expectations arising from the proposal developed early during Object of production B of large amounts of funding being applied for would not be realised. The Cluster Steering Committee felt a need to take ‘control’ (2004 interview). The decision to form a cooperative rather than a company or loose alliance was another point of difference between the TasIT Steering Committee members and those from the Department of State Development and Intelligent Island.

By May 2003 the decision to form a trading cooperative had been finalised. In August 2003 a formal invitation was issued to those wishing to take part in establishing a formal business entity for the Marine Science ICT Cluster in the form of a trading cooperative. At the beginning of this phase, participants dropped to 13, then to nine and at the final launch there were six firms. The collaborative activity had achieved its object of production at this point in its trajectory.
The influence of contextual conditions in the evolving elements of activity is implicit in the evolution of the collaborative activity. Clearly there were tensions in the evolving collaborative activity, tensions around the asymmetrical distribution of tools and power and control, mediated by contextual conditions. A closer look at the tools of collaborative activity consumed in the evolving Cluster and their mediation by contextual conditions, identifies further tensions and the complexity of activity in the ‘boundary space’.

7.3 CONTEXTUAL CONDITIONS AND COLLABORATIVE ACTIVITY

Table 7.2 sets out the elements of the collaborative activity of the evolving Marine ICT Cluster. Examples of contextual conditions are shown in italics. Along the top of the table are the elements of activity and the left-hand column lists the evolving object of production.

As well as summarising the evolving Cluster, Table 7.2 illustrates the changing relations within the collaborative activity mediated by contextual conditions. Each of the contextual conditions is evident – for example, capitalism (the mode of production) is evident in policy such as tendering out arrangements and cluster as an entity for commercialising intellectual property for the global market. The history of institutional arrangements mediated relations within the collaborative activity. Industry development – small Tasmanian firms – and the mode of production – competing against larger mainland firms are within the object of activity and the object of production. Government policy of tendering out, national policy supportive of clusters is also evident, as is the limited history of institutional arrangements, and institutional practices and policies. Each institution’s application of contextual conditions within the collaborative activity, in conjunction with their own practices mediates relations in collaborative activity. The mediation of contextual conditions and the mediation of each institution on the
collaborative activity of the evolving Marine ICT Cluster are discussed in detail below.

Table 7.2: Collaborative activity and contextual conditions

<table>
<thead>
<tr>
<th>Object of production</th>
<th>Institutional Subjects</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object of production A</strong>&lt;br&gt;An Information Technology Cluster involving GIS, Antarctic, Southern Oceans, Fisheries, Oceanography Studies as an alternative to the Intelligent Island Bioinformatics Centre of Excellence&lt;br&gt;Large number of research institutions influenced the focus of the object of production&lt;br&gt;Motive: Small firms competing with larger mainland firms</td>
<td>Key members of TasIT</td>
<td>Dialogue with Conference delegates Dominant discourse of technology, innovation, commercialisation as necessary for economic growth Knowledge of the state’s unique number of research institutions Knowledge of industry as constituting small firms Use of networks</td>
</tr>
<tr>
<td><strong>Object of production B</strong>&lt;br&gt;A Science / Information Technology Industry Cluster</td>
<td>Officers and Members of TasIT Champion Individuals from a number of research institutions Representative from local Council Representative from II Firms – that wish to expand perceive value in the object of production</td>
<td>Use of networks Background paper Discussion paper on applying for funding ($150,000) (May 2002) Expertise as required</td>
</tr>
<tr>
<td><strong>Object of production C</strong>&lt;br&gt;Marine Science Information Technology Cluster</td>
<td>As above, but included Department of State Development. Participants changed, and/or did not attend consistently Limited history of institutional arrangements influenced who continued to take part</td>
<td>Use of networks: limited history of institutional arrangements, limited strength of ties Workshop (Nov. 2003) Funding application ($35,000) Survey (Mar. 2003) Hegemonic discourses influenced distribution of tool and powers</td>
</tr>
<tr>
<td><strong>Object of production D</strong>&lt;br&gt;Need for control Trading Cooperative to build on the Information Technology skills and Intellectual Property generated in Tasmanian Scientific Institutions</td>
<td>At the beginning of this time, there were 13 small firms, numbers dropped to nine and then to six. Research institution policies contributed to research institutions withdrawing</td>
<td>Position papers Cooperatives Act Department of State Development institutional policy of tendering contributed to concerns with quality, processes and delay of survey and decision to ‘push on’</td>
</tr>
<tr>
<td><strong>Object of production E</strong>&lt;br&gt;To be the leader in the adaptation and commercialisation of ICT related intellectual property generated within the Tasmanian marine science community, in other local scientific institutions and in the ICT private industry.</td>
<td>Six small ICT firms</td>
<td>Writing tenders The rules and structure of the Cooperative Using networks, (including those developed in the process of developing the Cluster)</td>
</tr>
</tbody>
</table>
7.4 Mediation of Contextual Conditions on Collaborative Activity

Language as text and dialogue is fundamental to the consumption of discourses. Tools of language and rules of each the three institutions TasIT, the Department of State Development and Intelligent Island mediated the collaborative activity of the evolving Marine ICT Cluster and are themselves mediated by and expressions of contextual conditions as illustrated in Table 7.2.

Language is a foundational tool upon which many other tools are built. Tools of collaborative activity are termed boundary tools or instrumentalities (Engeström et al., 2003) as discussed in Chapter Two. To explore the language used in the ‘boundary space’ potentially provides a better understanding of a range of tools in collaborative activity. Text and dialogue in this thesis is understood as a tool that enables the use of other tools. It is a major cultural tool impregnated with cognitive and affective content (Wartofsky, 1979, p. 204) of ‘our’ language, the language of ‘insiders’ (Lotman, 1990). The idea of inside and outside, of ‘us’ and ‘them’ is, as posited by Giddens (in Heracleous, 2004, p. 101), the consequence of recurrent patterns of actions, based in interpretative schemes. Our language constructs ‘other’, that is, those subjects, organisations, cultures and so on, that we are not part of, we construct and understand ‘them’ stereotypically. For example, government workers in government departments are often referred to as bureaucrats with little or no understanding of ‘the real world’ outside their comfortable well-paid, secure existence. From within a group there is a common, shared – homogenous – set of values, practices and language presented to the outside or external world. In reality there are often multiple or heterogenous values, practices and languages, but labelling gets in the way of appreciating heterogeneity within groups, sometimes setting up impermeable boundaries. In the early history of relations between TasIT and the Department of State Development discussed in Chapter Four, this is what was taking place; each had a stereotypical view of the other. As a result it was
very difficult for them to work together; the language and culture of each had little meaning for the other.

Although this study did not include the collection of conversations and dialogue between subjects, the language used by respondents in interviews provides insight into the ‘cognitive and affective content’, the assumptions and norms of institutional subjects, and the language that identifies a sense of ‘us’ and ‘them’. An analysis of the different assumptions and understandings of cluster, evident in the language of respondents is given below.

The Department of State Development and Intelligent Island identified strongly with an understanding of cluster as centring on commercialisation of products for global markets as illustrated in the following quotes:

[Clusters are] an entity made up of a whole range of others that have got the ability to get things to market faster or value add to the businesses that they couldn’t do separately …

[For clusters to work] the market is the end … [it is necessary to have] the demand side and the supply side.

Clusters provide some of the best opportunities to access external markets

The Marine Cooperative needs to be more than industry players; you need to be thinking about your customers, your suppliers, and your research. I don’t think we call this marine area a cluster because I don’t think that we’ve got all of those players’ involved (2004 interviews).

The language in these quotes suggests that those involved in clusters require skills and capabilities to commercialise products, and to market and export products. This concept of clusters is supported by the Australian Institute for Commercialisation. It suggests that commercialisation requires research, an appreciation of the intellectual property position, market studies, identification of the point of differentiation in the market, investors and a business development plan (Australian Institute for Commercialisation Ltd, 2002).

TasIT perceived that Intelligent Island and the Department of State Development presented a unified rationale and understanding of cluster that
respondents interviewed from TasIT did not share. While the Department of State Development and Intelligent Island wanted the focus to be on developing commercialisation opportunities and taking up a commercialisation project, the TasIT focus was on developing a structure for the Cluster. TasIT member firms in the Cluster Steering Committee understood cluster as a strategic entity. One respondent describes their view of cluster development as not being based on the production of ‘widgets’ (products to sell), but as ‘trying to position ourselves in the market to be seen as the first point of reference for this sort of work’. The respondent goes on to say:

Most business culture is about widgets. Widget people don’t think strategically, they can’t. They have spent all this time and energy and money getting this widget ready to go and they’ve got to flog … them (2004 interview).

The ‘widget culture’ as described by the respondent above assumes a manufacturing approach to the development of firms, that is, it must involve the production of goods – a product. The same respondent suggests that, rather than the information technology industry being an industry based on developing products for sale, it is:

essentially a service industry, we fix problems. We don’t actually create new goods in a way we solve problems, the problem usually exists we don’t usually invent them… We’re trying to broker a service, we’re not trying to make a widget and sell it, we may make a widget and sell it as part of service development, the commercialisation of service is not a good it may not be part of it (2004 interview).

This concept of cluster reflects Benneworth and Charles’ (2001, p. 375) view of clusters:

Clusters are economic phenomena in the form of a conglomeration of firms with patterns of interaction which boost their competitive advantage. Clustering is a process whereby inter-firm linkages and cluster externalities are built up to what are disparate firms gain competitive advantage from their interaction.

Cluster, as a means for making the most of possibilities within the environment in which firms are operating, is an important assumption of cluster for TasIT and its members. While they did their utmost to involve a range of research institutions, and larger firms, the limited historical
collaborative arrangements between TasIT and relevant institutions constrained this aspect of their activity. The Department of State Development was aware of these barriers between research institutions and the industry and were seeking strategies to address these barriers. Had the research institutions become involved, then there may have been greater congruence between the three institutions of TasIT, Intelligent Island and the Department of State Development. For a social world to develop between these institutions a depth of understanding of underlying languages and the messages embedded in the language (Lotman, 1990, p. 143) is required.

These different concepts and understandings of cluster are examples of different boundary spaces around the concept of cluster being created. The ‘boundary space’ between the Department of State Development and Intelligent Island were open and permeable; the language and concepts they were using, overlapped. The ‘boundary’ between these institutions and TasIT seemed impermeable to TasIT; there was limited overlap in the interpretation and meaning of ‘cluster’.

These differences in the understanding of cluster could have encouraged dialogue:

Difference is central to the conversations we expect and hope to have. The various people with whom we converse at various times and places are different people in different places and times. Our conversations are with, between, among, and probably always about difference, at the same time notions about difference imply similarities within boundaries…In conversation, we discover our boundaries and transcend them as we interact with difference – that is, with each other – in a collective act of dialogic improvisation…In a conversation…we negotiate we discuss, we mistake, we mislead, and we otherwise stumble to a jointly creative response to the conditions of our understandings and misunderstandings (Mayerfield Bell, 1998, p. 53).

Difference is part of dialogue. Similarities within boundaries were present between the Department of State Development and Intelligent Island, but not for TasIT. Congruence is not always achieved, as Vygotsky notes:

Two people who attribute different content to the same work or who have fundamentally different perspectives often fail to achieve understanding (Vygotsky, 1987, p. 269 in Cheyne and Tarulli, 1999).
Where there are fundamentally different perspectives, when there is not just conflict between different methods of encoding, and disturbances closing ‘boundary spaces’ the potential for collaborative activity can be lost. The withdrawal of Intelligent Island and the Department of State Development was due to a ‘loss of interest’ (2004 interview) and the lack of congruence over the concept of cluster. This was a loss of potential resources and longer involvement in the collaborative activity by these two institutions. It seems, however, that the experience of collaborating did contribute to assisting a developing relationship as identified by the following TasIT respondent reflecting on the experience:

One of the good things about it is that you go to meetings, you get to meet people and get to know them better. You can have more informal contact and in general it’s been positive. It’s a developing thing; its something you can’t pinpoint as being one thing. One of the reasons is familiarity and trust develops. So you can get on the phone now and they’re familiar with what we’re doing say, ‘This is what we’re doing, what can we do now?’ or ‘Can you help us on this?’ Whereas before we got on the phone and we get, ‘Who the hell are you?’ So just knowing the people is important, very important. We’ve got a new appreciation of [research institutions and their work] (2004 interview)

The experience of being part of collaboration with other institutions is now part of TasIT’s history of experience, history of ‘knowing’ (Blackler, 1995) these institutions and is likely to contribute positively to future collaborative activity.

The gradual withdrawal of Intelligent Island’s and the Department of State Development from the Cluster Steering Committee at a time when they could still have been involved in a supporting role, cannot entirely be accounted for by differences in their understanding of cluster. Nor can these differences fully account for tensions such as differences in power relations at various times. The historical differences in interaction between the three institutions provide another part of the explanation for these tensions, as do the different institutional practices.
The Department of State Development and Intelligent Island are significant participants in each other’s communities of practice, whereas, at the time of the 2002 interviews TasIT was only on the periphery of this community, having only recently been included on the mailing list of the Department of State Development. While important to note that since 2002 there has been a growing and developing relationship between the Department of State Development and TasIT, understanding the historical experience assists in analysing why tensions existed.

Differences between bureaucratic government practices and private sector practices illustrate different assumptions and norms, that is, different discourses that are part of the multi-voicedness (Engeström, 1999) of collaborative activity. Different institutional practices were another source of tension, creating ‘boundary spaces’ with different degrees of permeability in the boundary between TasIT and the government-oriented institutions. For example, the processes around the survey managed by the government institutions, with requirements for tendering processes and long timeframes, were not congruent with private sector timeframes and the need for quick decisions:

Part of the problem was that we had a workshop in November 2002 and we were waiting on decisions about the survey and about other possible grants for about six months and there was no action. In the end we had, we just couldn’t wait, we just had to go ahead and do it. If we were going to wait on every decision to come through the government then there was no future in an industry cluster doing that. To a certain extent there was some frustration with Intelligent Island [Board, not from the Intelligent Island bureaucrat involved in the Cluster]… because we couldn’t get decisions (2004 interview).

Intelligent Island, on the other hand, reported frustrations with required paperwork not being submitted in time. Different practices and expectations were part of different encoding practices (Lotman, 1990) getting in the way of a common language (Camagni, 1991). The limited historical collaborative experience and limited institutional arrangements in the state did not provide examples of successfully overcoming differences to address these and other differences. Thus, the contextual conditions of history and institutional arrangements mediated the collaborative activity between these institutions.
Multiple experiences of collaborative activity was discussed in Chapter Two as being important in aiding development of procedures for information flow, interpretation and diffusion (Simonin, 1999, p. 603).

The distribution of power in the division of labour added to these barriers. The Department of State Development held power in terms of allocating funding and resources in relation to the workshop and survey tools. On the other hand, TasIT held a different form of power, the Cluster was initiated by them, and ultimately it was these members of the Steering Committee who would decide on the direction and processes of the developing Cluster.

Access to the decision making of the Intelligent Island Board was difficult for TasIT. TasIT’s perception of its own power and influence in relation to Intelligent Island was based on its historical experience with the Intelligent Island Board:

One has to look at the Intelligent Island Board structure. We suggested that it needed to have strong industry and by that I mean private industry representation on it and it ended up having an independent Chairman from Fujitsu in Sydney…But then it has heads of three Government Departments of Tasmania and two people from the Federal government department, it has the Chancellor of the University and it has an academic, from the University. So it is academics and government, and there is one representative from the private sector and there are two politicians. One lone voice…has got nowhere (2002 interview).

‘One lone voice’, was indicative of the lack of access, and ‘voice’ that might be heeded on the Intelligent Island Board for TasIT, contributed to a lack of trust and credibility for TasIT, as explained in Chapter Five. This contributed to limited participation in each other’s communities of practice, thus contributing also to the creation of less permeable boundaries and ‘boundary spaces’ between them. TasIT remained on the periphery of the boundaries of Intelligent Island and the Department of State Development, whereas these two latter institutions shared permeable boundaries through their shared discourses, bureaucratic practices (as a result of being established by State and Commonwealth government and administered by the Tasmanian State Government) and proximity of office area. Historical experiences contributed to an ‘us’ and ‘them’, insiders and outsiders (Stock, 1990) perception of each
other, keeping ‘boundary spaces’ between TasIT and the public sector institutions, impermeable. There was inadequate ‘socially shared, relationally responsive, perceptible understanding’ (Shotter and Billig, 1998, p. 25) between the government institutions and TasIT to further the dialogue.

To summarise, different institutional practices and discourses were expressed in the tools of collaborative activity such as understandings of cluster. Discourses were also evident in the rules of each institution and the ways in which they applied these rules, for instance the hegemonic discourse of outsourcing evident in the requirement for tendering contracts. Historical interaction between the different communities of practice also mediated the collaborative activity. Limited historical exchanges had not yet created adequate patterns of meaning in each other’s tools and objects to create a common language (Camagni, 1991). All these contextual conditions were instrumental in decisions to remain as part of the Marine ICT Cluster Steering Committee ceasing to take part in the trajectory of the object of production and in the way tools were used and interpreted.

7.5 Conclusion

When institutions collaborate they are operating within a ‘boundary space’. In both the collaborative object, the object of production and the object of each institution there is a degree of mutuality which enables participation in collaborative activity. As each institution finds meaning in the collaborative object of production in relation to its own object of activity, this contributes to the permeability and therefore structuring of the ‘boundary space’.

The research institutions were interested because they perceived the collaborative object and object of production A and to some extent B of the evolving Cluster as a tool for commercialising their intellectual property. This was important to them, because in some instances commercialisation was a
requirement of funding. The Department of State Development’s goal was to test the role of government in the development of clusters. They saw the evolving cluster as a tool to meet its purposes. TasIT, on the other hand, saw the Department of State Development as a source of resources and funding, tools necessary for the Cluster to evolve.

As each institution singles out properties ‘essential for developing [their] social practice’ (Lektorsky, 1984, p. 137), so they refine their ability to know it, and thus change it (Marx in Fischer, 1967, p. 152). The degree to which each institution did single out properties in the object ‘essential for developing [their] social practice’ was mediated by contextual conditions, and the interaction of each institution’s own activity.

The object of production mediates the selection and use of tools as well as who has access to them and when they have access. Tools likewise mediate the trajectory of the object of production and the cognition, the ability of the subject to know their social practice. Institutional subjects see a reflection or mutuality in the object of production of collaborative activity; it is of value to them. Each institutional subject perceives the value of the object of production differently. In this case study those that ceased to participate ceased to perceive value in the evolving object of production. These processes create tensions, asymmetries and disturbances.

In the ‘boundary space’ there is always tension, as alignment of needs, a meeting of different languages, cultural practices, asymmetries of power and the ability to use the tools of collaboration, interact. These differences encourage dialogue (Mayerfield Bell, 1998) but common language or congruence is not always achieved (Vygotsky in Cheyne and Tarulli, 1999).

In Chapter Two it was suggested that when there is a history of collaboration there is an increase in tolerance of ambiguity (Booz, 2000), exposure to
different operational methods, values and cultures (Owen and Bound, 2001) and collective learning, and therefore the development of trust (Amin and Thrift, 1994). These are examples of boundary tools which are important in collaborative activity (Boland and Tenaski, 1995). In the case study of the Marine ICT Cluster, these boundary tools were insufficiently developed to enable the tensions and contradictions to be either worked through or set aside.

Processes of learning through collaborative activity are explored in the next chapter.
Chapter 8

Institutional Collaboration as a Process of Learning

8.1 Introduction

Chapter Seven identified change in the collaborative activity of the evolving Marine ICT Cluster; change evident in the evolving object of production or motive of the Cluster, influenced by contextual conditions. As there are changes in relations of collaborative activity, different knowledge and learning are required. Given that subjects ‘single out’ what is meaningful to them in contextual conditions (Lektorsky, 1984, p. 137), that tools are impregnated with cognitive and affective content (Wartofsky, 1979), it follows that learning is a process that can be identified, by following the object of production as discussed in Chapters Three, Six and Seven.
This chapter addresses the research question: how can institutional collaboration be conceptualised as learning?

8.2 A LEARNING PROCESS

As shown in Chapter Six, each institution involved in the collaborative activity of the evolving Marine ICT Cluster, is involved in order to meet a need. The object of production is a collective object meeting, in varying degrees and ways, the needs of those taking part in the collaborative activity. The object of production creates multiple spaces in the ‘boundary space’ marking off areas where there is difference and opening areas of commonality. Other aspects or elements of activity also create multiple spaces within the ‘boundary space’ where there is difference and commonality. Engeström (1999a, p. 67) notes that the ‘emergence, aggravation and resolution’ of secondary contradictions may be thought of as a developmental cycle. As stated in Chapter Two, collective development depends on the ways in which contradictions and tension are dealt with (Blackler, 2004, p. 187).

Engeström (2001) notes that, in what he terms the ‘expansive learning process’ (p. 151), within established organisations there are actions of questioning and analysis of contradictions. Engeström’s (2001) expansive learning commences with questioning and examining secondary contradictions, modelling a new solution, implementing it and then reflecting on it. This process is an analysis of contradictions in established organisations, where members repeatedly work with the same contradictions. In collaborative activity, the developmental process of the work and timeframes mean that this is not possible. In collaborative activity, norms of the collaborative activity are in the process of being created, they are not established. Collaborative activity may lead to questioning by subjects of their own institutional practices, but that is not the focus of this thesis.
Subjects may also question processes, identify assumptions while acting in collaborative activity, but as this thesis relies on interview data of respondents recollections of what took place, the ability to analyse the processes of questioning is limited to their recollections and to analysing the documentary evidence.

Collaborative activity involves learning how to make the most of the opportunity the collaborative process provides collectively and for each institution involved. It is a process that involves being immersed in the relevant field and in the collaborative activity itself, managing tensions, making approximations of possibilities and risks, constantly responding, managing differing expectations and varying degrees of engagement and commitment. These characteristics of learning, immersion, responding, making approximations, setting up expectations and having expectations met have also been identified by other researchers (e.g. Cambourne and Turbill, 1987). Learning through activity necessarily involves immersion in that activity, albeit that immersion or involvement varies over time and for each institutional subject. Immersion or involvement in collective learning requires responses, verbal, non-verbal or written and in the process approximations are made by institutional subjects. Approximations in assessing meaning, purpose, values and intent interrelate with expectations of outcomes. The complex interaction of institutional tools and practices, the developing tools of collaborative activity and the evolving object of production and each institution’s object of activity mediate learning in collaborative activity.

In the collaborative activity of the evolving Cluster it was possible to identify specific phases of learning that in this thesis are termed ‘phases of collaborative learning’. These phases are developmental, and evolve with the evolving collaborative object of production, constituting a developmental process. Within each phase the characteristics of responding, approximating, setting expecting and having expectations, and taking responsibility, are
present. The phases of collaborative learning are depicted in Figure 8.1 and have been termed as:

- Connecting
- Interacting
- Participating
- Committing

As will be shown later in the chapter, immersion, demonstration and expectations are evident in the connecting phase. For example, in Chapter Seven expectations of possible access to funding were discussed. In the interacting phase, approximation is most evident as is engagement in the commitment phase. Response is critical to all phases. As developmental phases, they do not have clear-cut commencement and completion times, rather there is a blurring of one into the other. ‘Connecting’, which involves immersion and networking, is consistently evident throughout the collaborative process. However, there are phases which are identifiable at a point in time, as will be explained in the following sub-sections.

The following analysis expands on each of these ‘phases’, examining what takes place in each phase and how each phase relates to the evolving object of production, subject and tools. The relations of production are an expression of the mediation between subject, object of production and tools requiring different learning and knowledge tools.
Each phase is tied to the evolving object of production discussed in Chapter Seven and shown in Table 8.1. Table 8.1 shows the evolving object of production related to each phase, and the subjects’ perception of the object during each phase.

8.2.1 The Connecting Phase

Connecting is the process of making connections between ideas, in this case, the idea of an ICT Cluster, and others immersed in the field – that is, networking is intrinsic to this phase.

The originators of the idea for an ICT Cluster built expectations, establishing credibility, in this instance through finding a champion. They are connecting with people, with an evolving idea, with potential resources who they hope will see opportunities. This was undertaken through an unfolding use of networks already known and used by the initiators, and in turn people in these networks contacted others connecting them to the initiators and the idea and potentially bringing with them resources and other ideas.
Table 8.1: Evolving object of production and phases of collaborative activity

<table>
<thead>
<tr>
<th>Phase of collaborative activity</th>
<th>Object of production</th>
<th>Subjects’ perception of the object</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting</td>
<td>Object of production A&lt;br&gt;An Information Technology Cluster involving GIS, Antarctic, Southern Oceans, Fisheries, Oceanography Studies as an alternative to the Intelligent Island Bioinformatics Centre of Excellence</td>
<td>Reflection between their object of activity and the evolving object of production of the Cluster</td>
</tr>
<tr>
<td>Interacting</td>
<td>Object of production B&lt;br&gt;A Science / Information Technology Industry Cluster&lt;br&gt;Object C&lt;br&gt;Marine Science Information Technology Cluster</td>
<td>Mutual interest between their object of activity and that of the evolving object of production of the Cluster</td>
</tr>
<tr>
<td>Participating</td>
<td>Object of production D&lt;br&gt;Trading Cooperative to build on the information technology skills and Intellectual Property generated in Tasmanian Scientific Institutions</td>
<td>Confirmed mutual interest</td>
</tr>
<tr>
<td>Committing</td>
<td>Object of production E&lt;br&gt;To be the leader in the adaptation and commercialisation of ICT related intellectual property generated within the Tasmanian marine science community, in other local scientific institutions and in the ICT private industry.</td>
<td>Transformed object of production</td>
</tr>
</tbody>
</table>

The network diagram in Figure 8.2 depicts the connections between people and how they knew each other. At this stage, relations of collaborative activity are in the networks, in that the information and evolving idea is distributed through these networks, with each institution or firm interpreting and perceiving the collaborative object of production according to their own object of activity and their goals, as shown in Figure 6.1.

In Chapter Two it was noted that networks are important for information exchange and learning (Jin and Stough, 1998, p. 1266) and that networks
consist of strong ties and weak ties (Granovetter, 1973). Strong ties are made by those who share common bonds, whose relations endure over time, have similar social identities and exchange reciprocal services. Weak ties are ties connect individuals/groups/organisations that have little to do with each other and are noted for their capacity to bring new information and resources that would otherwise not be accessible. Weak ties include indirect contacts; more people can be reached through weak ties.

The initiator of the Cluster idea was a key person in TasIT who had his own information technology business. Through these roles and historical connections he knew either socially or professionally, those individuals shown in green in Figure 8.2. These are examples of strong ties (Granovettor, 1973). Connections made outside these networks are more distant and are examples of weak ties (Granovettor, 1973). In some instances, existing networks were used by subjects from other institutions to make contact and a
relation formed around the evolving object of production. In the example below, the champion initiates contact.

It was 2002. I was just considering different information technology activities happening across the State. I was thinking to myself that there might be further opportunities for Hobart to have something here or in the region to have something happen. So I rang the president of TasIT at the time and said, 'Look what's going on what are the different projects that are on the go and is there anything that I can help in, help to promote or otherwise?' (2004 interview)

Another respondent was unable to take part at the beginning but was available later in the process. The evolving object of production of the Cluster Group had met this respondent’s expectations and perceptions of what was required for success:

There was an email that said it was going to happen and it was just the wrong time for me – I was at a stage, we in a busy period and a number of projects. I thought, ‘Oh yeh that’s good I’m interested in that, oh bugger it I can’t go. ...’. I couldn’t go to the initial meeting, 30–40 people turned up, I couldn’t get there I just wasn’t available. Then a little bit later I noted [name] and I know [name] and a couple of the people that were involved I knew through industry contacts. I thought it’s got a bit of credibility and it’s got momentum let’s see where it’s at (2004 interview).

Terms such as ‘credibility and it’s got momentum’ and ‘I’m interested’ indicate a connection between this firm’s trajectory and that of the evolving Cluster. Ilyenkov (1960) writes about reflection in the object. Those taking part, saw in the evolving object of production of the Cluster Steering Committee a reflection of their own institution’s goals in the object of production of the evolving Cluster.

Small Medium Enterprises (SMEs) face enormous constraints in competing successfully due to limited skill sets, limited access to scientific, technical and commercial informal information and resources in general (Hansen, 1992, p. 97). These are all contributing factors in subjects finding a reflection of their own firm’s or institution’s object of activity in the object of production of the evolving Cluster. Connecting was enhanced as much of the networking was undertaken in a geographic region, such proximity increases the concentration of information and the speed of information flows (Hansen, 1992, p. 97). Use of networks enables access to, or distribution and exchange of, knowledge
(Bauer and Snow, 1996) and resources (Gulati, 1999, p. 398), such as information about clusters and how they worked in other regions.

Flora, Flora and Wade (1996, p. 68) point out that networks are most effective when they are diverse, inclusive, flexible, horizontal and vertical. Achieving vertical networking where there is a range of contacts with differing, asymmetrical access to power and influence is difficult. This was partially achieved by finding a champion, who provided credibility to invite relevant people from research institutions (who were identified largely through existing networks). However, this provided only a minimal entry into the research institutions and over time brought the Cluster Steering Committee face to face with the difficulties of breaking through institutional boundaries. The mix of strong and weak ties shown in Figure 8.3 enabled some relationships to quickly develop around the evolving object of production, and the weak ties brought in diverse scientific information technology possibilities for commercialisation, knowledge of clusters, the commercialisation process and potential for ongoing networks. A range of firms and institutions that had not worked together before, and in many cases had not known each other, were brought together.

8.2.2 THE INTERACTING PHASE

The interacting phase was the phase in which there was a great deal of movement, challenge and tension, movement of subjects, evolution of the object of production and a range of tools used by different institutional subjects. The interacting phase is where and when those taking part seek to find meaning in the evolving object of production for their institution.

In the interacting phase, discussion of what the meaning of cluster is for those involved was being established. Minutes indicate that in this phase discussion moved from the original object of production in the connecting phase of Antarctic/Southern Oceans/Fisheries/Oceanography Studies Cluster to being
a Science/Information Technology Cluster and then later in this phase to a Marine Science Information Technology Cluster. The process began with the preparation of a draft business proposal containing a suggested vision, mission, aims, objectives, possible stakeholders, the cluster concept, progress to date and where to from here? The objectives included the establishment of a management structure for a successful cluster in the Tasmanian marine information and technology and engineering fields as well as developing a marketing campaign, getting early commercial success, attracting government and non-government financial support and working with the Department of State Development to showcase Tasmania’s information technologies, research capabilities and products (Friend, 2002).

The ideas in this document persisted for the core group of initiators and some others who became involved later. Participants from the research institutions contributed ideas for possible commercialisation projects; in this phase there was considerable discussion about a multitude of possibilities. For those undertaking support roles the focusing object of production led to different expectations from those of the initiators of the Cluster.

Research institutions saw the Cluster as an opportunity to commercialise but also as a critical part of a value-adding chain, as identified in the following quote from a research institution respondent:

*I’d been hearing about clusters through the [name of organisation] technology diffusion activities. Understanding how some things can float if you have the chain correct you can follow things right through by cascading things. So ideas, techniques, better production, shorter turn around times and so on* (2004 interview).

This subject saw clusters as part of a value-adding chain, where a research institution may have an idea and develop it, members of the Cluster may produce it and other research institutions may be the customers. This research institution subject was looking for ways to commercialise as his institution’s funding was tied requirements to commercialise. He recognised an opportunity and saw meaning in the evolving Cluster; namely, that the Cluster could assist this institution to achieve one of its goals –
commercialisation. The evolving Cluster represented a mutual opportunity over the phase of Object of production B. This is a further development from the connecting phase where those taking part had seen the potential, a reflection of their institution’s object of activity– ‘they thought it might work’ – with the evolving object of production to a mutual interest – ‘we’ll keep a watching brief’ (2004 interviews).

The interaction phase relates to Objects B and C shown in Table 8.1. It is a phase where institutions and firms taking part have moved beyond seeing a reflection of their object of production in the object of production of the Cluster Steering Committee, to seeing a possible mutual opportunity and having a common interest in that opportunity. During this interacting phase there is still a great deal of connecting with organisations moving in and out of the Steering Committee. One respondent reflects on the movement of subjects in and out of the Committee:

> It started out as about 30 or 40 people. Probably half those put their hand up because they thought, ‘Oh yeh it might work, opportunity at the door,’ that sort of attitude. So I think they were going to fall by the wayside anyway. There were quite a few other companies that were sort of interested but for instance the owners of intellectual property of the company might have rested with three or four people; they were involved with the Cluster and the other two weren’t. It’s difficult to communicate that they saw the Cluster as being an advantage. So we’ve got a couple of people that were in the original group so to speak that have come back and said look, ‘I would have voted for it but I was voted down’. So they thought we’ll keep an eye on it we’ll keep a watching brief on it, if it comes good we’ll join in (2004 interview).

‘Opportunity at the door’ is indicative of seeing a reflection in the object of production but, as this respondent notes, it is necessary to see more than a reflection if the subject is going to continue to take part. For those subjects that did see a mutual opportunity, how well they were able to convey this to their colleagues along with the distribution of power in these firms determined their continuation, or not, in the Steering Committee.

During the interacting phase each participant/participating organisation was:

- Finding and determining their role and the role of others
- Determining the degree of mutuality between the object of production and the object of activity and the goals and actions of the institutions taking part and the
These were key processes in the interacting phase, and are discussed below.

8.2.2.1 Object and Role

Roles in the Cluster Steering Committee were to some extent predetermined by the rules and division of labour in each institutional subject’s own institution, and the subject’s perception of possibilities for how the Cluster might operate. This respondent from a research institution explains:

I was never going to become a member, and neither was [name of individual from another research institution]. A few others, we weren’t going to put up money because we had no businesses we were going to get a return on. So we were really just support people in that context (2004 interview).

Both the respondents referred to in this quote are from research institutions where the rules governing intellectual property and commercialisation require lengthy negotiations involving a range of decision makers and experts from within each institution. In both cases, the respondents did put forward proposals to their respective institutions, the institutions responded within the terms of their intellectual property arrangements, wanting to know more about specific operating arrangements of the Cluster. Subjects from the research institutions saw themselves primarily as providing support generally in the form of information about possibilities for commercialisation.

The difference in the objects of these institutions also explains their response. These institutions were not businesses. In fact, their object of activity was about research; the overlap between the object of production of the Cluster and that of the research institutions was there because of policy and funding requirements for commercialisation of research. However their rules governing intellectual property and how they would relate to a business required a much deeper knowledge of the evolving cluster. This was problematic as the Cluster was not yet established but was looking to include the research institutions to increase the potential and credibility of the Cluster. At this stage the research institutions, as institutions (as opposed to the
subjects involved in the evolving Cluster), did not find adequate ‘meaning’ in the Cluster.

The role of the Department of State Development was bound up with its institutional policies, rules and its object of activity and the goals it had developed to work towards this object of activity. As identified by the respondent quoted below, the Cluster represented an opportunity to test policy development. The role of this institution was one of support and assistance which at the same time enabled them to progress their goals as the following respondent notes:

It was like I was handed something on a platter because I’d been sitting here in isolation thinking to myself, ‘I really want to pilot something in clusters and where State government fits in.’…I wanted to be able to test the waters and see. I went to the first meeting; it was just like a text book in that they’d formed up to a certain development and they seemed to have the right players around the table…So it was really good timing I think for the State government to get involved because they had actually formed themselves. It was organically done. It wasn’t anything that government intervened in…I just said I’d like to test the cluster principles and they just said so did they…So I thought our input was to assist the cluster to see if it’s worth going forward (2004 interview).

The goal of this institution was to test the role of government in cluster development. It was never going to be part of the Cluster once it was established. For this institution, the Cluster had utility as an opportunity to test policy development. Contextual conditions such as policy which nationally and internationally was valuing cluster development, was within the motive of the Department of State Development. There was mutual interest between their object of activity, their goals for action and the object of production of the evolving Cluster, but their motives differed.

As with the Department of State Development, the role of other institutions and firms was linked to the degree to which there was mutual interest between their object of activity and their goals and the object of production of the evolving Cluster:

[The reason for becoming involved with the Cluster was] getting work, but the problem with getting work is not getting it per se. It’s getting interesting work, getting work that has long term strategic advantage for the business… We do most of our work interstate. So that puts us in a position where we
need to be able to scale up; the cost of scaling up is quite high and so is the risk, the risk is considerably higher than the cost. The opportunity the Clustering model gave us was to get a broader client base. With the cluster we see that we could be involved in jobs that are worth $3–$5 million a year (2004 interview).

This subject saw an opportunity, a reflection and a mutual interest between the object of activity of his firm and the goals of the firm and the object of production of the Cluster. This respondent continued to be part of the Cluster Steering Committee, he saw not only potential utility, but also perceived the Cluster as a means of increasing profits.

8.2.2.2 MUTUAL INTEREST AND MORE SPECIFIC NAMING

The Department of State Development and Intelligent Island, as discussed in the previous chapter, expected the Cluster would focus primarily on a commercialisation project as a means of involving larger firms in the state and the research institutions. As this phase evolved, the degree of mutual interest was questioned by some institutions. As more specific understanding and naming (Boland and Tenaski, 1995) evolved and subjects came to know differences, these differences became a source of concern for some subjects. This moved these subjects back to within their own boundaries, closing off boundaries for collaborative activity in these cases. One respondent, for example, describes their involvement as moving from one of support by providing information to moving out as expectations differed. In other words, as different meanings were found within the object of production, difference became primary. There were no ‘tools’ through which these differences could be worked through:

I wasn’t engaged, I didn’t make it a priority in my diary… I think I was brought in primarily to provide some input but also we were seen as one form of funding. So one of us in to give advice…[I looked at how] industries and research institutions could work together because that was going to engage. I looked at some projects, looked at some possibilities. Then I had the job of coming up with a couple of cluster models and I remember doing some work on the Western Sydney Information Technology Cluster. I went back and talked to [The Cluster Steering Committee] and explained to them at the next meeting about the Western Sydney Cluster governance structure. And it was a bit like, I got a sense of, ‘Oh well very nice but that’s not appropriate we won’t even consider that.’ So I just thought, ‘Ah there’s an agenda here,’ and I remember talking to a couple of other Steering Committee members saying, ‘Look I think this is the wrong way round, its setting up a structure,’ so I stepped back (2004 interview).
Difference is being identified. This respondent notes that setting up a structure was considered ‘the wrong way round’. From the perspective of this institutional subject, the trajectory of the evolving Cluster at this stage should be to identify and begin the process of commercialising a product. When the Cluster Steering Committee made the decision towards the end of the interacting phase to set up a structure, the trajectories of the evolving Cluster and the two government institutions parted. This is acknowledged in the following quotes:

I think there is that bit about both of us wanting different outcomes… We wanted something that was more holistic than just supply driven, we wanted to know where the markets were (2004 interview).

I believe that setting up the group without having a project, without having a market opportunity is the wrong way to go. It’s like a tail wagging a dog. If there are market opportunities identified and enterprises then the group get together to address that opportunity you don’t set up the Cooperative and put all that effort. But there was no amount, we couldn’t persuade (2004 interview).

Decisions by subjects to stay in as part of the Cluster Group or move out are influenced by the meanings they found between their institutional object of activity and the object of production of the Cluster. The concept of Cluster development differed and therefore so did the actions or strategies to achieve a Cluster. Naming, or how something is named (Freire, 1977), influences what action is taken. There was no evidence of attempts at naming that would provide meaning to all or more subjects.

There were a number of subjects in this phase who decided there was limited mutuality or even no alignment between the object of activity of their institution and the object of production of the Cluster Steering Committee. They therefore ceased to attend meetings.

As the Cluster Group increasingly moved toward Object of production D – developing a trading cooperative – the mutual interest in the Cluster was not adequate to sustain the involvement of all those subjects who had participated this far. Had there been greater previous knowledge of each other’s practices
and skills in making visible what was taking place, the outcomes may have been different.

These encounters described above marked the end of the interacting phase and the commencement of the participating phase.

### 8.2.3 The Participating and Committing Phases

Institutions involved in the participating phase of collaborative activity were demonstrating that their expectations had been met; they were demonstrating a deeper level of involvement, termed in this thesis as ‘participating’.

Participating is used here in a similar sense to the way the term is used in the community of practice literature (Lave and Wenger, 1991; Wenger, 1998). That is, becoming a full participant is a process (Lave and Wenger, 1991, p. 29), it takes time and is gradual. Those continuing to take part were tentatively engaged; a final commitment had yet to be made.

This phase equates to Object of production D, the development of a trading cooperative. In this phase Cluster Steering Committee members had been through the stage of determining the degree of mutuality of the collaborative object of production and that of the object of activity of their own institution and confirmed there is mutual interest. By this time the group was much smaller, but more stable. There was increasing clarity about roles, and principles important to the Cluster Steering Committee were confirmed and embedded in the developing structures.

Only firms were involved in this phase, many of them members of TasIT. As previously discussed, other institutions had left in the interacting phase. Those remaining perceived the Cluster as leading to another avenue of interesting work that is part of much larger projects resulting in increased profits. In this phase each participating subject is:
Moving beyond perceiving mutuality in the evolving object of production to aligning the object of activity of their organisation with that of the Cluster

- Determining structures and rules of the evolving Cluster
- Aligning the values of their organisation with those of the Cluster

The decision to form a trading cooperative was influenced by a combination of ‘circumstances’ and contextual conditions. These included government policy, the small size of firms in the industry and state government practices resulting in larger tenders going to medium-to-large non-Tasmanian firms. This context influenced the goals and commitment of TasIT to form goals of competing effectively, and keeping work within the State. These TasIT goals found reflected meaning (Engeström et al., 1995) in the evolving Cluster’s consumption of the Cooperative Act (as a tool). This meaning was an expression of principles evident from the Steering Committee’s inception.

Developing a trading cooperative as opposed to an association or company structure is a powerful expression of the principles of democracy, cooperation and shared decision making. These are shown in the following objective from the draft business proposal put up at the first formal meeting of the Steering Committee:

To establish a management structure that engenders trust, facilitates cooperative endeavour and provides management and marketing expertise to the stakeholders (Friend, 2002).

These values were confirmed and embedded in this phase. Similar ways of working are also expressions of shared principles, values and beliefs, a finding of meaning in each other, as discussed in Chapter Two:

[We] trust each other... I’ve got to be able to go to someone in the cluster and say to someone I need this produce and I need it in three weeks. You said you could do it three months ago. They might say I can’t do it in the next fortnight but I’ll have this much in this amount of time, I may not make it in that time. All of this gets it out there, if there’s a problem we want to know about it now, not tomorrow. I think that way of working suits me, suits the way I think and I think it suits most of the members of the Cluster (2004 interview)

Those remaining in this phase trusted each other and had similar ways of working with similar practices.
Values of cooperative endeavour were also evident in a sense of social good in developing the industry:

I think anything that generates more work would be good for the industry. Essentially it also means if its good work, interesting work it also means diversifying skills and that builds the industry. When I go looking for a programmer I’ve got more chance of finding a programmer in the industry that’s going places than I have in an industry that is moribund (2004 interview).

The sense of social good in developing the industry was evident at the inception of the collaborative process and was expressed in the mission tabled at the inaugural meeting, using language such as ‘providing pathways for information technology businesses, government and scientific organisations to collaborate in new ways’ (Friend, 2002, p. 2). These principles and ideals were embedded within the object of production of developing a structure for the Cluster:

The members see that what we’ve created is valuable in the actual structure. There was a majority perception coming across that we’re talking strategic not jobs focus. Members were seeing that this is a strategic opportunity that we need to form a body, get ourselves organised, get out there in the market and make noise and get people interested (2004 interview).

This respondent expresses a synergy of meaning-making between those subjects who made the final step to committing and becoming members of the Marine ICT Cluster. There is, at this phase an agreement that the Cluster is a longer-term strategic device for accessing large projects not previously available to participating firms.

The six firms that made the decision to be members of the Marine ICT Cluster trading cooperative were committed and engaged. This is the commitment phase of collaboration. The object of production had been transformed, moving the Cluster in a new direction.

8.3 Conclusion

The phases of institutional collaborative activity evolve as the object of production evolves. In the process different tools are used and a contested social world begins to develop. As expectations differ, responses are
interpreted in multiple ways, differences and tensions inherent in the institutional collaborative activity begin to surface. In this case study the institutional collaboration concluded with the establishment of a stable, ongoing structure, the Cluster as a trading cooperative. However, in many instances of institutional collaboration, such structures may not be the outcome, as for example in the collaboration between institutions in the Industrial Commission over the award conditions discussed in Chapter Five. The object of production is influenced by contextual conditions as are the tools available to the collaborative activity and the ways in which they are used.

To take part in the connecting phase participants must be immersed in the type of work the collaborative activity is focusing on. This requires actively being part of relevant networks and organisations. Initiators of the collaborative activity establish expectations around an evolving object of production and respondents then make an approximation of the fit between their institutional object of activity and their cognition of the collaborative object of production as it is at that point in time. If they see a reflection of one object in the other, they move into the collaborative activity.

The collaborative activity is properly established in the interacting phase where participants come together and begin to work towards more specific understandings, making approximations of key terms and in the process determine if there is mutual interest between the object of production of the collaborative activity and that of their own institution. Approximations continued to be made, testing the extent and depth of perceived mutual interest. For some subjects this resulted in a focus on the differences.

Institutional subjects must learn how to make sense of these multiple meanings and institutional arrangements in order to be regarded as accountable. Meeting expectations is a matter of situated knowing of how to continue in the specific social practices, thus we act ‘into’ the social
circumstances into which we must fit our action (Shotter, 1993). Roles and the type of contribution are also determined by each institution’s rules and object of activity. Thus responsibility for the trajectory of the object of production is distributed across the group, depending on the tools used at any one point in time. Different institutions have more or less competence with different tools, and more or less power and influence are exercised with and are part of a tool.

Those participants who move to the next phase of collaborative activity – participating – have established an alignment between the evolving object of production of the collaborative activity and their own institution. Mutual principles and ideals are confirmed and become part of the developing social world and its structures. In this way shared or mutually held principles and ideals are practiced, through a tentative engagement, which is a testing of whether or not there will be commitment.

Commitment is the phase where those taking part have pledged to take part in the structures of the collaborative activity. The object of production has been transformed, leading to a different trajectory. The structures and roles are by now stable. That is, these institutional subjects have engaged in the collaborative activity.

The next chapter explores learning in collaborative activity not just as a process, but analyses the ways in which contextual conditions mediate learning in collaborative activity.
Chapter 9

Ways in Which Contextual Conditions Mediate Learning in Institutional Collaboration

9.1 Introduction

In Chapter Eight, learning was conceptualised as a process, in particular a process of change over four phases. Within each phase subjects singled out (Lektorsky, 1984, p. 137) what was meaningful to them as participants in collaborative activity. In Chapter One learning was defined as collective, requiring social relationships within which subjects make meaning, as they participate in activity. Chapter Two added to this understanding of collective learning the idea that collective learning is about encountering difference by working across different histories, practices and purposes. Collective learning across these diverse histories, practices and purposes requires information flow and knowledge creation, coordination and decision making, routine and problem-solving heuristics, the development of common understandings and the building of trust and support. As shown in Chapters Six and Seven, contextual conditions mediate collaborative activity and therefore learning in
this activity. This is the focus of this chapter, to explore and analyse the ways in which contextual conditions mediate learning in collaborative activity.

It will be argued in this chapter that the social relations of production of collaborative activity produce tensions and contradictions. Such tensions and contradictions are a necessary part of activity. As Ilyenkov (1982) in his writings on Marx’s *Capital* notes, interconnection ‘is not realised through sameness’ (p. 1) but interaction contains a ‘unity of opposites’ (p. 2); one thing cannot exist without its opposite (p. 3). Tensions and contradictions inherent within the social relations of production are a source of learning. What is learned is problematic (Lave, 1996, p. 8), not that learning occurs. The characteristics of collective learning discussed in Chapter Two are developed and learned, or not, through collaborative activity. As shown in Chapter Seven contextual conditions are an intrinsic part of the collaborative object of production and the tools used. Contextual conditions mediate collaborative activity, and therefore learning.

Given that collective learning, in this thesis, is understood as requiring social relationships, it is appropriate to turn to Leontyev (1977) and his work on ‘relationships between participants arising in the process of labour’, that is, ‘social relationships’ (p. 6). In this thesis, the ‘social relations of production’ (Marx, 1973) are critical to understanding learning in collaborative activity.

The first section of this chapter analyses some different types of tools and their mediation of learning. It is then argued that the properties each subject detects in a tool are mediated by the social relations of production. The final section contends that contextual conditions are intrinsic to the social relations of production of collaborative activity and mediate learning.
9.2 Mediation of Learning and Tools

Collaborative activity, like any activity, ‘obeys the system of relations of society’ (Leontyev, 1977, p. 3). Contextual conditions are part of the system of relations of society, and thus influence relations between subjects in collaborative activity. The ways in which contextual conditions mediate social relations and therefore learning in collaborative activity will be shown in section 9.3. What is important here is the idea that relations influence subjects’ ‘image’ and thus ‘detection’ of the ‘properties’ (Leontyev, 1977, p. 3) of the collective object of production. If ‘mediate’ is understood as acting on, through an intermediary entity, then whatever tools subjects have access to and consume, or use, mediate the properties or characteristics subjects ‘detect’ or perceive in the object of production. For example, in their use of the Cooperatives Act, TasIT Steering Committee members ‘detected properties’ that addressed their image of an organisational entity that would provide them with access to larger tenders, and more interesting work, including possibilities for commercialisation as the Cluster grew and developed. TasIT Steering Committee members also perceived that the Cooperatives Act provided them with a structure that would ensure equitable returns and voice for members, important values to those who became members. The Department of State Development did not detect these properties in the Act as their goal was to test the role of government. Similarly with Intelligent Island, their goal was to assist in developing commercialisation opportunities and develop export potential. A trading cooperative did not meet the needs of the Department of State Development and Intelligent Island.

The Cooperatives Act was a resource tool for the TasIT Steering Committee members. Another tool used in the collaborative activity was the concept of cluster. Each institution’s ‘image’ of a cluster was shaped by their object of activity and their goals. For example, the Department of State Development and Intelligent Island valued commercialisation of intellectual property. Therefore a cluster for these two institutions would necessarily involve
commercialisation. Examples of clusters of this nature provided by these two institutions to the Cluster Steering Committee were not valued by TasIT Steering Committee members. This was because commercialisation was not a primary motive, particularly when it became clear that funding they had expected to be able to access was not to be forthcoming. Concepts of cluster were tools for making meaning of actions in the collaborative activity.

Other types of tools used were rules and procedures each institution brought with them to the collaborative activity mediating their ways of acting in the collaborative activity, and thus relations. These could be called structural tools and would also include informal and formal rules adopted by those taking part in the collaborative activity, such as meeting procedures. An example of a structural rule mediating relations in the collaborative activity was the tendering arrangements used by the Department of State Development to manage the survey.

For the purposes of this thesis, these tools can be classified into three broad categories: resource tools, meaning-making tools and structural tools. Resource tools include skills, tools such as the survey and the workshop used by the evolving Marine ICT Cluster. These tools may also include the use of policy programs, legislation, funding, proposals and position papers. Structural tools include the rules of engagement of each institution, for example, research institutions have specific rules around intellectual property and insurance requirements; the Department of State Development has rules governing outsourcing arrangements. Structural tools also include what exists in a region or an industry, for example, the information technology industry consists largely of small firms. Meaning-making tools include the consumption of ‘“ready-made”, historically evolved meanings’ (Leontyev, 1977, p. 15):

[Meanings] are produced by society and have their history in the development of language, in the history of the development of forms of social consciousness; they express the movement of science and its means of cognition, and also the ideological notions of society-religious, philosophical
and political. In this objective existence of theirs, meanings obey the socio-historical laws and at the same time the inner logic of their development.

[There is a second, hidden life of meanings] their functioning in the processes of the activity and consciousness of specific individuals… In this second life of theirs meanings are individualised and “subjectivised” only in the sense that… they enter into another system of relationships (Leontyev, 1977, p. 16).

Relations within collaborative activity are an example of ‘another system of relationships’ in which subjects interpret meanings produced by society. The relations of collaborative activity will influence what interpretations of meanings are made by subjects. This begs the question: what are the social relations of collaborative activity?

9.3 THE SOCIAL RELATIONS OF PRODUCTION OF COLLABORATIVE ACTIVITY

In this chapter and throughout Chapters Six, Seven and Eight, the terms ‘use’ or ‘consumption’ of tools, and ‘access’ to or ‘distribution’ of tools have been employed. For example: use of networks, access to networks, resources, skills, markets, funding, power and influence. Marx employs the terms consumption and distribution as part of explaining the relations of society ‘generated by the development of production’ (Leontyev, 1977, p. 3). Although referring to the activity of specific individuals, Leontyev’s claim holds true for collaborative activity. Production, consumption and exchange (Marx, 1973) generate social relations within collaborative activity. Collaborative activity is a process of production, in that labour power is used or consumed through tools, tools and materials are made accessible, or distributed within collaborative production to meet a need. This is explained by Leontyev in the following quote:

Human needs are generated by the development of production. After all, production is directly also consumption, which creates need. In other words, consumption is mediated by a need of an object, its perception or its mental presentation (Leontyev, 1978, p. 2).

Relations of production are mediated by consumption and by the object of consumption.
Exchange, like consumption and distribution, is inextricably linked with production:

In so far as exchange is merely a moment mediating between production with its production-determined distribution on one side and consumption on the other…

…the exchange of activities and abilities which takes place within production itself belongs directly to production and essentially constitutes it. The same holds secondly for the exchange of products, in so far as that exchange is the means of finishing the product and making it fit for direct consumption. To that extent exchange is an act comprised within production itself. Thirdly the so-called exchange between dealers and dealers is by its very organisation entirely determined by production, as well as being itself a producing activity. Exchange appears as independent of and indifferent to production only in the final phase where the product is exchanged directly for consumption. But there is no exchange without division of labour (Marx, 1973 p. 99)

The exchange between consumption and distribution within production is the process of mediation between the distribution of tools, labour and materials and their consumption for production.

Vygotsky’s (1978) concept of mediated action, explained in Chapter Six, is a useful concept to apply consumption, distribution and exchange in relation to collaborative activity. Vygotsky argued that stimulus response between subject and object is mediated by tools (cultural means and signs). The social relations of production as discussed above can be applied to the concept of mediated action, as shown in Figure 9.1. The subject consumes or uses tools that have been distributed through a process of exchange, towards meeting a need – the object of the activity and the object of production. Tools mediate the actions of subjects and the trajectory towards meeting the need, the object mediates what tools are consumed and how they are consumed and distributed and the subject also mediates the consumption, distribution and exchange of tools, also influencing the trajectory of the activity.

For example, the Steering Committee’s consumption of the tool of a position paper (a resource tool) to meet the object of production of setting up a trading cooperative was physically accessible, distributed, to all institutional subjects involved at that point in time. The position paper proposed what TasIT members called a ‘strategic’ focus of cluster. This occurred during the participating phase of collaborative activity. Wertsch (1998, p. 47) makes the
claim that there are differences in the facility of different groups to use tools. Institutional subjects did indeed consume this tool of the position paper differently. The properties detected in the object of production in relation to this tool by each subject differed. TasIT members of the collaborative activity perceived the proposal for a trading cooperative as entirely consistent with the proposal document put forward at the commencement of the interacting phase, to meet their need for a ‘strategic entity’ to gain larger tenders. However, not all subjects perceived and therefore consumed the position paper in the same way.

There are a number of reasons for this. One was related to the distribution and accessibility of tools used earlier, such as the original proposal document. Because subjects came and went in the collaborative activity, those who were not present did not have access to the original proposal in the same way as those who were present when it was first presented. Different institutional subjects used or consumed different meaning-making tools to interpret and consume, or not, the position paper. The lack of tracking of participants meant, as observed by one respondent, that different subjects had ‘different parts of the picture’ (2004 interview). The distribution of tools within the collaborative activity influenced subjects’ perception of the object of production and their interpretation of other tools.
Another reason for the different consumption of tools such as the position paper was the distribution, consumption and exchange of meaning-making tools. For example, the Intelligent Island and the Department of State Development’s understanding of cluster as a commercialisation process requiring the production, marketing and exporting of products differed from the TasIT understanding of cluster. TasIT understood cluster as a ‘strategic entity’ (2004 interview) where clusters are economic phenomena aimed at boosting competitive advantage through inter-firm linkages (Benneworth and Charles, 2001, p. 375). These two different understandings of cluster, a strategic entity discourse of cluster and a commercialisation discourse of cluster, were used by the respective subjects to interpret, make meaning of actions and other tools used in the collaborative activity. That is, this was part of each institutional subject’s exchange within collaborative production.

These relations of production, the consumption, distribution and exchange in the collaborative activity result in a complex interaction, with each institutional subject consuming, distributing / accessing and exchanging tools differently. Not only was each institutional subject learning differently, as is to be expected, but their interpretation of the collaborative object of production and of tools mediated their actions.

However, these are not the only mediating processes. Engeström (1999, p. 5) states that Leontyev’s crucial dialectical concept was the concept of commodity as a contradictory unity of use value and exchange value. Social relations of production produce value, specifically use value and exchange value:

The utility of an object makes it a use-value independent of the amount of labour required to create its useful qualities. Commodities constitute the substance of all wealth and are the material depositories of exchange value. At first sight, exchange value presents itself as a quantitative relation in which use-values are exchanged and which constantly changes with time and place. This is not so. An article is exchanged for a wide variety of other goods equally. Exchange value expresses something equal in two commodities. If we leave out their use values commodities have one common property, being products of human labour in the abstract. An article has value only because human labour in the abstract is embodied in it. However, there are some objects that are not commodities, yet command a price.
Uncultivated land, for example, has a price, but does not contain value since it contains no human labour (Marx in Freedman, 1976, p. 27).

*Use value* is about utility. For example, the Department of State Development found *use value* in the evolving Cluster as an entity through which to test the role of state government in cluster development. Firms found *use value* in the evolving Cluster, as a means of gaining more interesting work. *Use value* can be applied to the object of production, as well as to tools, or ‘commodities’ (Marx in Freedman, 1976, p. 27). Instruments or tools which are themselves the product of labour, are consumed to make another product, in this way they have *use value* in activity. For example, the survey, a tool used or consumed in the collaborative activity, had within it the labour of bureaucrats who had developed the tendering out process, the labour of those who managed the contract for the survey, and the labour of those who produced the survey.

There are multiple layers of interpretation of contextual conditions in such a tool. For example, the capitalist mode of production, as historically interpreted by state government agencies, led to practices in the Department of State Development of not tendering out projects of more than $10,000. Other possible arrangements such as keeping the work in-house and employing personnel to do this work or a joint arrangement with the Cluster Steering Committee or handing over the funding to the Cluster Steering Committee were not a consideration. Those who managed the contract for the survey, including the drawing up of the brief, interpreted or made meaning of the intent of the survey as expressed at the workshop, through their knowledge of the information technology industry and its interconnections or possible interconnections with other industries and the research institutions, as well as requirements about levels of consultation with the industry. All these matters are interpreted through hegemonic and institutional discourses and practices. That is, hegemonic discourses are a meaning-making tool; however, hegemonic discourses are also overlayed by, for example, institutional discourses, such that institutional subjects make meaning of contextual conditions through the lens of their institutional discourses embedded in institutional practices.
Exchange value has within it human labour. Potential exchange value was perceived by firms in the object of production of the collaborative activity, as it offered the potential to increase profits in exchange for the labour embodied within the establishment of the Cluster and the activity carried out by an established Cluster. By the time of the launch of the Cluster it was only those that perceived exchange value in the Cluster that remained. Research institutions, for example, had initially perceived use value in the Cluster to meet their need to commercialise under their funding arrangements. Exchange value is a driving motive in the capitalist mode of production. For example, knowledge is treated as a commodity that has exchange value; the intellectual property developed with public monies, of the research institutions, was perceived by those involved in the evolving Cluster as a commodity for private profit. As discussed in Chapters Six and Seven, these hegemonic discourses permeated the very concept of the Cluster.

9.4 TENSIONS AND CONTRADICTIONS IN THE SOCIAL RELATIONS OF COLLABORATIVE ACTIVITY

Tensions and contradictions in the collaborative activity were evident in different interpretations of cluster, the different practices of the public private sector dichotomy and in the history of relations. The public private sector dichotomy is one that is inherent in relations between these sectors; one cannot do without the other, they form a unity of opposites. The roles those from each sector play are of necessity diverse. In the interacting phase the institutions from these sectors have in common the collaborative object of production. But as Ilyenkov notes, the dialectical approach to common is based on a particular shade of meaning. Namely that common:

has the meaning of bond which by no means coincides in its content with the identical features of different correlated objects, men, and so on (Ilyenkov, 1982, p. 4).

The object of production provides a connection between the institutions of the public and private sector in that:
each cannot exist without the other because it has a characteristic which the 
other does not posses and vice versa (Ilyenkov, 1982, p. 5).

This was evident, for example, in Figure 6.3 which illustrated that the 
Department of State Development’s goal was to test the role of government in 
cluster development, and TasIT’s goal was to develop a cluster to enable 
small firms increased market share. The Department of State Development 
needed the TasIT members and TasIT needed the Department of State 
Development as a provider of resources, including funding.

This ‘unity of opposites’ influences the social relations of production. As 
discussed so far in this chapter and in previous chapters, the consumption and 
distribution of tools differed for each institution that was part of the 
collaborative activity. Each institution experienced exchange differently and 
each perceived different value, be it exchange or use value in the object of 
production.

9.5 Contextual Conditions and Learning in 
Collaborative Activity

As indicated in Section 9.3, historical, socio-political, economic and 
ideological forms are inherent in the social relations of production. 
Contextual conditions, as illustrated in Table 7.2, arise from the capitalist 
mode of production as shown in Figure 6.1. For example, infrastructure and 
resources such as the existence of a significant number of research institutions 
in Hobart in the area of marine studies in the Southern Ocean was critical to 
the evolving object of production of the collaborative activity. The limited 
history of institutional arrangements is a recurring theme in each institution’s 
consumption, distribution and exchange of tools. The problematic of 
information flow, trust and ability to find meaning in each other’s 
institutional object of activity and their goals and institutional tools can be 
traced in part to contextual conditions such as different interpretations and 
applications of hegemonic discourses such as commercialisation and
innovation. Other examples include finding different meaning in policy tools such as tendering out and the Cooperatives Act.

Thought and action are ‘conditioned’ as institutional subjects interact with the dominant mode of production. Marx explains that ‘man’ (sic) belongs to a particular social formation, a class, a nation, a historical epoch and is therefore conditioned by the totality of these circumstances in his (sic) mode of behaviour, possibilities, needs and decisions at any given time but it is also ‘man’ who changes circumstances (Fischer, 1968, pp. 155–156).

That is, circumstances make ‘men’ just as much as ‘men make circumstances’ (Marx in Fischer, 1968, p. 92). The ‘system of interaction’ (Ilyenkov, 1960) or relations of production and mode of production mediate activity. However, contextual conditions and their mediation of the social relations of production are largely invisible to those taking part in the collaborative activity, as are the social relations of production. Contextual conditions as intrinsic to social relations of collaborative production ‘function in the processes of activity’ (Leontyev, 1977, p. 16) and are appropriated (Wertsch, 1998) individually and collectively by institutional subjects taking part in the collaborative activity.

In the case study investigated in this thesis, tensions and contradictions were not ‘made visible’. This is different to the focus on difference written about in Chapter Seven. Institutional subjects identified differences, for example, in the object of production of the evolving cluster and that of their own institution and in the interpretations of cluster. What institutional subjects did not identify were the sources of these differences. How is it possible for subjects to identify the sources of their differences and what they have in common?

9.5.1 Making Tensions and Contradictions Visible

To encourage the development of the characteristics of collective learning it is first necessary to make the tensions and contradictions visible (Engeström,
1969; Boland and Tenaski, 1995; Blackler, Crump and McDonald, 2000) to those taking part in the collaborative activity. The visibilisation process in established organisations, as developed by Engeström (1999), involves a number of steps. The first step is to identify and question myths used to explain disturbing work practices; the second step is to analyse contradictions and tensions in the activity system and to conceive of a worst-case future and a possible future in which contradictions are resolved. The third step in this process is to design and develop new actions by examining tools and reconfiguring them to develop new tools. The final step is implementation and monitoring (Engeström, 1999, pp. 68–69). Aspects of this process are possible to apply to institutional collaboration, where established practices are not yet developed and will be discussed further in Chapter Ten. An important part of the visibilisation process is the envisaging of the trajectory of a future object. Engeström (2005) notes that the re-forging of objects to rediscover use values is the process of reshaping work and learning.

Another process is that developed by Boland and Tenaski (1995) who suggest that subjects taking part in collaborative activity need to ‘perspective take’ and ‘perspective make’ as discussed in Chapter One. Perspective making is the development of more coherent meaning structures (moving from general naming and understanding to more specific understandings and naming) as individuals and groups work together. Perspective taking is the process of examining one’s own assumptions and of others, and of imagining the point of view of others. For the process of perspective taking to proceed, the diverse knowledge held by individuals must be made available for others to incorporate in a perspective-taking process that is, differences are recognised, acknowledged and valued. The unique thought worlds of others need to be made visible and accessible to others. As each group seeks to meet its needs through the object of production, it is necessary to uncover something of other group’s internalities, that is, to establish a language that all understand.
The first step is differentiation. Only after a perspective is differentiated can it be reflected on and represented so the actors from different groups or activity systems have something to integrate. Once a representation has been made of an individual’s knowledge, it becomes a boundary tool, providing a basis for perspective taking (Boland and Tenaski, 1995). This suggests there is a role for facilitators of collaborative activity.

These processes of visibilisation did not take place in the collaborative activity investigated in this thesis. Chapter Ten will discuss possibilities for this process for similar future endeavours.

9.6 Conclusion

Contextual conditions are intrinsic to the social relations of production. The social relations of production mediate what properties subjects detect in the object of production and in the tools consumed in collaborative production. Each subject detects in the object of production their own meaning, that is, each subject appropriates (Wertsch, 1998) their own meaning within the socio-historical, political and economic period of development and in the process ‘subjectivises’ (Leontyev, 1977, p. 16) that meaning. Structural, resource and meaning-making tools are products of historical relations of production and carry within them past and current meanings. To consume tools is to make meaning of these tools. In consuming or using tools, the tools must be accessible, that is, distributed, albeit symmetrically. Distribution and the appropriated meaning of a tool(s) govern exchange in collaborative production. The process of consumption necessarily involves the processes of distribution and exchange as part of collaborative production.

These processes elicit tensions and contradictions inherent in the social relations of production. There is necessarily a unity of opposites. What links different institutional objects at the same time creates a tension, an opposite. In the case study investigated in this thesis, tension in the use value and exchange value of the object of production for each subject involved was
ultimately that which determined which institutional subjects’ perceived meaning in the object of production and which did not.

To understand learning in collaborative activity it is necessary to understand the mediating function of the social relations of production. Contextual conditions are inherent in the social relations of consumption, distribution and exchange. By understanding the ways in which contextual conditions are present and how they mediate the social relations of collaborative production, it is possible to make ‘visible’ (Engeström, 1999) tensions and contradictions of the collaborative activity and in the process analyse what meaning each institutional subject has appropriated from the contextual conditions.
CONCLUSION

10.1 INTRODUCTION

This final chapter articulates the findings of this thesis, discusses the implications and offers suggestions for further research. The chapter commences with a brief overview of the research questions and how they have been addressed in previous chapters.

The aim of this study was to investigate the complex interaction of institutional collaboration, learning and contextual conditions analysed in the Tasmanian information technology industry. The first research question was addressed in Chapter five; what is the history of collaboration between institutions in the Tasmanian information technology industry? This is a
descriptive account of what was a limited historical experience of collaboration in this young, small industry.

Chapters six and seven addressed the research question; in what ways do contextual conditions influence institutional collaboration? This question is a major finding of this thesis, breaking new ground in the ways context has been analysed in the literature until this point. Chapter six established the theoretical framework elaborating what has been characterised in this thesis as seven contextual conditions and identifying that collaborative activity takes place in multiple boundary spaces. The ways in which these contextual conditions mediate institutional collaboration was addressed in Chapter seven. This Chapter introduced the notion of the evolving object of activity, naming this object as the object of production, and provided extensive evidence of the mediation of contextual conditions on the collaborative activity of the Marine ICT Cluster.

The next research question was addressed in Chapter eight; how can institutional collaboration be conceptualised as learning? In this Chapter it was established that there were a number of phases of learning in the collaborative process. These phases of learning are linked to the evolving object of production.

The final research question was addressed in Chapter nine; in what ways do contextual conditions mediate learning in institutional collaboration? In this Chapter institutional collaboration was conceptualised as a process of production, consumption, distribution and exchange, through which contextual conditions can be mapped. Learning is mediated through the social relations of production within which contextual conditions are embedded.
10.2 Findings

There are a number of innovative findings arising from this study with the exception of the first finding, that historical precedent establishes pathways (Putnam, 1993) confirms what is already evident in the literature. The following findings constitute new knowledge to the way we understand collaboration, context and learning. Each of these findings is elaborated on below.

- Historical precedent in collaborative activity is important, as it establishes patterns of interaction, however these patterns can change.
- The broader socio-political and economic context mediates collaborative activity.
- This broader socio-political and economic context, can be broken into a number of contextual conditions.
- By reconceptualising collaborative activity as:
  a) a process of production, consumption, distribution and exchange
  b) occurring in multiple boundary spaces
this allows for the mapping of interactions in the relations of collaborative activity, providing us with the ability to analyse the ways in which contextual conditions are mediating the activity.
- Reconceptualising the object of activity as having multiple dimensions, not only the object of activity, but also the object of production.
- Tools used in collaborative activity can be categorised as meaning-making, resource and structural tools.
- Phases of learning take place in collaborative activity. These phases are closely aligned to the object of production.
- Mapping the processes of mediation is possible as a result of the reconceptualisation of collaborative activity as a process of production, consumption, distribution and exchange.
Historical precedent in collaborative activity establishes patterns of interaction, however these patterns can change.

The regional institutional literature discussed in Chapter two identified that previous experience develops skills in working with multiple, diverse perspectives and ambiguity (Putnam, 1993; Booz, 2000). Given that difference and tension (Engeström et al., 1995) are part of the terrain of learningful industries (Owen & Bound, 1998), these skills are important. Working across boundaries requires high level skills in the development of a language through which to develop coordination and decision making processes. Formal and informal coordination mechanisms for interaction and exchange (Keeble et al., 1998; Lorenz 1989) are particularly important, as the exchange of information is the basis for the initiation of collaboration. As noted by Maskell and Malmberg (1999), historical precedent influences possibilities for the development of trust and reciprocity. Where historical precedent is one of mistrust, and there are few skills in collaborative activity, there is limited shared understanding and common ground on which to establish constructive collaboration. However, as these skills are developed and dialogue established, previous patterns of interaction can change.

The broader socio-political and economic context mediate collaborative activity

As noted in Chapter two, in much of the team, organisational, networking, regional and institutional literatures, context is either ignored or is tacked on rather than being intrinsic to analysis of the phenomena under study. Much of the collaboration literature as discussed in Chapter two suffers from the same problem. The partial exception to this was the activity theoretical literature which does indeed integrate context into an analysis of activity. However, context in the activity theoretical literature is the situated context, with the broader socio-political and economic contexts given minor recognition but not integrated into an analysis of activity and actions. This is despite earlier, seminal writers and researchers of this tradition recognising that activity is
mediated by the system of relations of society; that human activity is conditioned by the circumstances of an historical epoch (Marx 1973; Ilyenkov, 1960; Leontyev, 1977).

By analysing context through a number of contextual conditions, listed under the next finding, these conditions become a tool to investigate the ways in which contextual conditions mediate collaborative activity.

This broader socio-political and economic context, can be broken into a number of contextual conditions

Conceiving the broader socio-political and economic context as a number of contextual conditions is a more manageable a way of perceiving and working with the idea of context. The contextual conditions, as identified from the data and listed in Chapter six are:

- Mode of production
- History
- Hegemonic discourses
- Stage of industry development
- Government policy
- Infrastructure and resources
- Institutional arrangements

These contextual conditions are interrelated and interconnected. The mode of production, capitalism, permeates all other contextual conditions. As it evolves and changes, so too does the historical trajectory, the hegemonic discourses such as the need for constant growth and commercialisation for global markets. There are multiple discourses within capitalism, including institutional and professional discourses. The stage of development of an industry is influenced by each contextual condition. Infrastructure and resources refer to both the topography of a region or state and therefore the opportunities it offers. It also refers to infrastructure developed through government policy and private industry. While institutional arrangements are dependent on all contextual conditions, it is particularly dependent on the
conditions of industry development and government policy. The stage of industry development is a factor in the depth and range of experience of information exchange between institutions. Government policy may or may not encourage or actively assist the development of institutional arrangements. That is, formal or informal arrangements between institutions to develop a history of information exchange, knowledge creation and collaborative experience.

Reconceptualising collaborative activity and the object of production

By reconceptualising collaborative activity as:

a) a process of production, consumption, distribution and exchange
b) occurring in multiple boundary spaces

this allows for the mapping of interactions in the relations of collaborative activity, providing researchers and practitioners with the ability to analyse the ways in which contextual conditions are mediating the activity.

This thesis conceptualised collaborative activity as taking place in multiple boundary spaces. The literature analysed in Chapter two referred to boundary crossing. The concept of boundary is explored further in Chapter six. The analysis of data in this thesis identified that the evolving object of production supports the idea that boundaries do indeed change, are fluid (Fitzpatrick, 2000), permeable (Lotman, 1990) and create spaces for learning (Engeström, 2004). In these boundary spaces there may or may not be agreement or sharing; it is a site where there is tension, where difference is highlighted. The degree of permeability is dependent on the mediating influence of contextual conditions and the extent of overlap in motives and the need being met by institutions taking part in collaborative activity.

The permeability of boundaries is dependent upon the overlap, or not, of each institution’s object of production and the collaborative object of production;
the meaning-making, resource and structural tools and their distribution, consumption and exchange in the collaborative activity. These processes are mediated by contextual conditions that ‘enter’ (Leontyev, 1977) collaborative activity through the productive processes of that activity and appropriated meanings which inevitably results in tension.

The previous paragraph referred to the object of production as opposed to the object of activity. The object of production reflects Marx’s seminal conceptualisation of object. Marx (1973) wrote about the motive for production and the object of production (p.91), that is, that which is produced. In this thesis the conceptualisation of the object of activity as the motive has been retained, but added to this is the notion of the object of production. This reconceptualisation is undertaken in Chapter seven.

Reconceptualising collaborative activity as a process of production, consumption, distribution and exchange intrinsically recognises the inherent motive for collaboration; namely to produce. The ‘product’ produced maybe any of all of the following: a service, a physical innovation, a set of ideas, a system of support. In the process of producing the product there is consumption, distribution and exchange, as explained in Chapter nine, section 9.3. This reconceptualisation also gives recognition to the social relations of production within collaborative activity. Labour power is used or consumed through tools, tools (including ideas and language) and materials are made accessible or distributed within collaborative production and exchange takes place. It is further argued that mapping these social relations of production can make visible the ways in which these relations mediate action and the collective activity.

Meaning-making, resource and structural tools

In this thesis tools have been categorised as meaning-making, resource or structural tools. Resource tools include skills, facilitation tools, policy
programs, legislation, funding, proposals and position papers. Structural tools include the rules of engagement of each institution, for example, research institutions have specific rules around intellectual property and insurance requirements. Meaning-making tools include the consumption of “‘ready-made’, historically evolved meanings’ (Leontyev, 1977, p. 15), they are the language and discourses through which participants make sense of what is taking place.

Resource tools, structural tools and meaning-making tools carry within them historical, social, political, economic and ideological forms evident in the language and practices belonging to these tools. In the processes of activity, these forms enter the social relations of collaborative production as subjects appropriate them. That is, in collaborative production, tools are consumed differently, different meaning is appropriated and applied, labour, power and influence are distributed, most often asymmetrically, and constitute exchange in collaborative production.

Phases of learning in collaborative activity

In Chapter eight, four phases of learning were identified: connecting, interacting, participating and committing. The phases of learning are a developmental process, predicated on the evolving object of production of the institutional collaborative activity.

Connecting is so called because the work in this phase involves using networks to spread an evolving idea and to gather support and credibility. During this phase, individuals, other activity systems and organisations see a reflection (Ilyenkov, 1960) of the object of activity of their own firm, institution or activity system, and that of the object of production of the collaborative activity. Networks are a key tool in this phase of collaborative activity. Networks are important for information exchange and learning (Jin & Stough, 1998), gaining access to resources (Gulati, 1999, p.398), skills and
knowledge (Hanssen-Bauer and Snow, 1996) and allow for the sharing of risk (Tallman and Atchinson, 1996, p.371). Aspects of the connecting phase, such as networking, continue to be evident in the interacting and other phases.

In the interacting phase the evolution of the object of production is part of a process of more specific naming. In this phase subjects determine the extent to which there is mutuality between the object of activity and the goals of their institution, firm or activity system, and that of the evolving collaborative object of production. Subjects also find and determine their role and the role of others. Movement through this phase is a process of differentiation, of defining and finding meaning for those involved. Differences in the object of production of the collaborative activity and the goals of each institution, firm and activity system are highlighted in this phase. The diverse roles each institution has in collaborative activity necessitate a unity of opposites. As different meanings and interpretations are made of the object of production different values, be they use value and/or exchange values are perceived by institutional subjects. The perception of different values relates to the different roles and meaning perceived in the collaborative activity by those taking part. Differences in appropriation can be attributed to the diverse roles of each institutional subject. Social relations of production necessitate a unity of opposites, where one subject cannot do without the other. The public-private dichotomy, for example, is at the same time a relationship of difference and connection.

The degree to which mutuality between the evolving object of production and institutional objects is critical in determining which institutional subjects continue into the participating phase. Participating is used similarly to the way it is used in the community of practice literature (Lave & Wenger, 1991; Wenger, 1998). Subjects are engaged in participating, in a process of moving towards and into an evolving social world.
Learning during these phases can be described as a number of processes such as having expectations, seeking to identify if these would be met through, for example, making approximations between the object of activity and the object of production of the institution taking part and that of the evolving collaborative activity. Those taking part need to be immersed in the field of activity; in processes such as determining roles and interpreting meaning. Institutional subjects also need to demonstrate commitment and practice values identified through the processes of more specific naming, and finally of engaging through committing to the organisational entity.

Mapping the processes of mediation

Mediation in activity theory is based on the work of Vygotsky (1981) who wrote about mediational means. Mediational means explained Vygotsky “recreates and re-organizes the whole structure of behaviour just as a technical tool re-creates the whole structure of labor operations” (1981, p.140). Later activity theorists such as Wertsch (1995) claim that mediational means (tools) are culturally, historically and institutionally situated and therefore it could be argued that these dimensions mediate ways in which tools are used and thus our thinking (and vice versa). Tools also mediate what is possible and what is not possible. While it is acknowledged in this thesis that this is indeed the case what is not taken into account in previous conceptualisations of mediation is the relations of activity and the ways in which these mediate not only action, but the collective activity. To say that different types of tools structure labour relations and other types of tools structure behaviour is inadequate as the types of tools are only part of the dynamic, dialectical relations of activity. So if mediation is understood as the process of relations, rather than merely stating that tools mediate action, it is possible to analyse the ways in which tools are used or consumed, the ways in which they are distributed and exchanged and thus in the collective sense how the social relations of production mediate the activity. When combined with the concept that context is embedded in the social relations of production, that is in the tools the rules of engagement used the trajectory of the activity and the ways in which they are consumed, distributed and exchanged, this is this a
powerful tool of analysis. In addition, it provides for analysis of activity, not only at the level of the action of individual(s) where analysis has taken place to date, but at the collective level of activity.

10.3 Contributions of This Thesis and Their Implications

This thesis makes a number of major contributions to new knowledge and tools of analysis discussed below.

The socio-political and economic context can now be understood as contextual conditions that mediate activity. Context has traditionally been conceived of as a tack on or throw away term (Seddon, 1994). The socio-political and economic context is multi-dimensional, somewhat amorphous and difficult to conceptualise. Conceiving socio-political and economic context as contextual conditions begins to address these difficulties. Context in the collaboration literature (see Chapter 2) was noted as including history, discourses and by Wertsch (1995) as having historical, cultural and institutional dimensions. This thesis adds to these understandings by identifying seven contextual conditions. An important contribution of this thesis is the naming of these conditions. Therefore, it is now possible to map the ways in which these conditions mediate collaborative activity. Previously this was problematic. The implication of this is that contextual conditions can be used as a tool of analysis by policy makers, practitioners and researchers.

This is important because as found by this study, context is embedded in everyday activity. This is another major contribution to new knowledge. As Seddon (1994) claimed and is evident in the collaboration literature (see Chapter 2) context is perceived as other, as that which needs to be managed as part of the external environment. Alternatively context is considered in the activity theoretical literature as situated context, not as the socio-political and economic context. The implications of this are that by considering context as embedded in activity, practitioners, researchers and policy makers alike can
use this understanding as part of analysing where collaborative activity is headed at different points in time and ways in which context is mediating the trajectory of the activity, the tools various participants have access to and the ways in which they are using these tools.

Conceptualising collaborative activity as taking place in multiple boundary spaces and as a process of production, consumption, distribution and exchange, is also a contribution this thesis makes to the literature on collaboration and to activity theory. The notion of boundary and spaces has been extended, providing a useful metaphor to appreciate the degree of permeability of boundaries between those taking part in collaborative activity. Conceptualising collaborative activity as a process of production provides a tool for mapping relations within that activity at any given point in time, remembering that these relations are dynamic and are mediated by contextual conditions. The implications are that a further analytical tools have been developed. These tools can be used to facilitate collaborative activity. This is important, given the increasing use of and need for collaborative activity.

Recognising that collaborative activity undergoes a number of phases of learning is a contribution that allows those new to collaborative activity to appreciate that the process is not smooth or necessarily linear. The implications are that participants new to collaboration can more readily perceive that it involves difference, tensions and a process where meaning is made by different participants according to the tools and rules they are using and have access to.

Adding to activity theory the concept of the object of production, reinstates Marx’s original conceptualisation of object. The object of production is easier to identify than the object of activity. Following the object of production assists in identifying the phase of learning any collaborative activity is in at a point in time. Identifying the object of production is important when mapping the relations of collaborative activity.
To apply these contributions and their implications in a more specific way means for example that, analysing contextual conditions becomes a tool for policy makers in identifying where their efforts and resources might best be placed. It is evident from the findings of this thesis that collaboration between institutions is critical to industry development. Policy makers have an important role of to play in facilitating such collaborative capability and to encourage the development of relations and exchange between institutions between the employers, research and government institutions. The important role of universities in regional development, identified in Chapter two further suggests that these institutions are critical to institutional arrangements. The literature on developing regional milieu reviewed in Chapter two suggests that multiple approaches to industry development are required, including festivals, seminars, formal mechanisms for developing information flow and knowledge creation. There are a range of international examples (e.g. Keeble et al., 1998; Maillat, 1995; OECD, 1999) to be drawn on and adapted. The challenge is to adapt strategies for regional environments. The need for rich formal and informal exchanges between firms, industry institutions, educational institutions, chambers of commerce, government agencies and community organisations could be developed and applied in ways appropriate to a small regional environment rather than apply understandings and strategies from large, more developed industries.

10.4 Further investigation

This was a single case study within one small State concentrating on three institutions. There is, therefore ample opportunity to extend the study and test and validate the findings.

A comparative case study of institutional collaboration in different socio-political and economic contexts has the potential to test and validate the findings of this study; given that the contextual conditions of institutional
arrangements, industry development in other industries and infrastructure and resources would be different. For example, these different contextual conditions may well mediate the social relations of production and the phases of collaboration in different ways, thus providing data to further develop and hone these phases.

The three institutions at the core of this study were also peculiar to the State of Tasmania, at a point in time. A study involving different institutions and therefore one where the focus is on the contextual condition of different institutional arrangements is another variation within any or all of the above possibilities for further investigation.

Given the critical importance of collaborative activity between institutions a study of an active intervention employing the frameworks outlined above has extensive potential contributing to sustainable regional and industry development. An interventionist approach working with researchers, facilitators and institutional respondents would not only develop skills in all those involved, but would contribute to specific collaborative endeavours. The findings of a national study of multiple cases could also feed into industry and regional policy development. The processes and boundary tools developed in such a study have potential to add extensive new knowledge to an understanding of collaborative activity, the theoretical basis and supports of and for collaborative activity.


AIIA. (2002). *Snapshot of the ICT Industry in Australia: Australian Information Industry Association (AIIA).*


Australian Business Foundation Limited (ABF). (1997). *The High Road or the Low Road? Alternatives to Australia's Future: ABF.*


Hubert, H. (2004). Knowledge clusters and entrepreneurship in Reigo development


Expertise: Research and applications (pp. 171-182). Mahwah, NJ: Lawrence Associates.


TACIPPRITAB. (2002). *Key training priorities*. Hobart: TACIPPRITAB.


APPENDIX 1 THE RESEARCHER

Data collection and interpretation is mediated through the researcher, and it is therefore necessary to declare my values, beliefs and experiences as they relate to this study.

I spent ten years teaching English and social science to secondary students, and brought my knowledge of learning and teaching to bear when I was appointed for two years as a National Industry Training Officer/Women’s Training Officer with the now defunct Trade Union Training Authority (TUTA). This was followed by three years as a Workplace Change and Training Officer for a union I had undertaken significant amounts of training for while with TUTA.

During five years as a union Workplace Change and Training Officer, I learnt two major lessons. The first lesson related to my role as Training Officer. I came to realise and is recognised in the literature that off-the-job training, however much you work with the situations experienced by delegates in the workplace and participatory and empowering training strategies, does not lead to real change. Although I did see success at the individual level with individuals feeling empowered to become more active and involved in the Union as a result of my work with them.

The second lesson I learnt in my role as Workplace Change Officer. Workplace change processes aimed at moving to a new award through increasing productivity by empowering workers to have input into decisions, processes and workplace practices were more dramatically unsuccessful. At the beginning of the change process I saw mistrust and scepticism evolve into participation and real commitment when it became evident that the Union was working with what appeared to be a committed employer. For example, we had negotiated that each work unit in a large government department would constitute a group, facilitated by a workplace facilitator jointly trained by
Union and management to redesign their work to increase productivity. This gaining of hard-won trust turned to anger and frustration when the employer failed to provide adequate resources and failed to understand the intricacies of change processes, and all the hard work, commitment and participation of Union members was ignored as a result. I believe this failure to understand change processes was more than this; it was due to entrenched practices and a real fear on the part of the employer and management of empowering their workers. The fear was a reflection of similar responses across the country and was epitomised in the struggle between North Broken Hill Peko (NBHP) and its workers where NBHP asserted their absolute right to manage and dictate to workers what happens to workers on the job. This dispute as with a number of similar disputes reflected the strategy of the New Right who wanted labour market deregulation, and a winding back of the welfare state and the role of government in all spheres. Members of the New Right held powerful positions in Australian society – business, industrial advocates, in the universities, government bureaucracies and in parliament (Wishart 1992, p.40). This political push has over the years come to be the reality of today. For me, this illustrates the link between those with economic power, dominant ideologies and possibilities.

The experience of being a member of an industry stakeholder body and working with a major employer that was also an industry stakeholder, illustrated the complexities of working together, and highlighted for me the games and power struggles within and between participating parties. As a social activist in the peace movement, the women’s movement and the student movement in the 1970’s and 1980’s and an activist in the trade union movement I believe that change should be driven from the bottom up. This means we need to become aware of the sources of power and dominant ideologies that support that power at multiple levels.

Following my five years in the Trade Union movement, I was Principal of my own training business. I found this frustrating because as an outsider, I was
not able to follow through on learning, the development of ideas and policies developed during the sessions I conducted. I felt a strong commitment to the need for following through change over time and supporting it appropriately, but was limited in my role to do this.

This led me to first casual and then a continuing series of short-term contracts undertaking research at the University of Tasmania first as a research assistant and then a Junior Research Fellow. I also taught casually in the Bachelor of Adult and Vocational Education undergraduate degree in the Faculty of Education. In 2004 I worked part-time for the Tasmanian Technical and Further Education Institute working with organisations in their change programs and delivering vocational education and training and assessment. This was another experience which exposed me to workplace change processes. In January 2005 I was appointed as a Lecturer in Adult and Vocational Education.

Examples of publications from the research projects I have been involved with and in some cases nationally coordinated are listed below.


APPENDIX 2: CHANGES IN THE RESEARCH QUESTIONS

1999
What supports and/or inhibits learning at the industry level, and to what degree does learning assist innovation and the creation of knowledge at industry level?

Rationale:
What is it which makes one industry better able to respond in today’s rapidly changing world? Australian industry operates in a global market place, where OECD “countries face largely the same market conditions and use more or less the same technology and sources of information” (OECD ). Industry is made up of a wide range of diverse peak bodies and interest groups, comprising employer bodies, unions, ITABs, professional groups and others. The potential for tension between these multifaceted groupings which comprise peak industry bodies and opportunities for sharing of knowledge and influencing decisions, is considerable. Industry operates in a complex world, influenced by: the place of the Australian economy within world trade; government policy; changing labour markets; changing technologies; the need to operate in environmentally sustainable ways and the idiosyncratic nature of local economies. The direction of many of these influences is underpinned by the prevailing theories and ideologies of the day.

2000
Research Question: What enhances or inhibits industry learning?
The purpose of this research is to investigate what supports and/or inhibits learning at the industry level, that is learning within the Industry Training Advisory Board (ITAB) structure of ITAB, unions and employer bodies. The specific aims include:

- to what degree the workings of each of the ITAB tripartite arrangements demonstrate a learning culture within their own practice;
- to explore how contextual factors, hegemonic discourses, climate and culture enhance or inhibit knowledge flow and knowledge creation and its contribution to innovation.

2001
Research Questions
To what extent do diverse groups such as PIBs, work together successfully?
1. How do PIBs deal with diversity of interests?
2. What kinds of environs do PIBs operate within and how do they deal with challenge?
3. What are the characteristics and requirements for effective collaboration amongst PIBs?
4. What are the factors necessary for diverse groups to be innovative?

**FOCUS OF THE STUDY**

To address the question, to what extent do diverse groups work together effectively, one particular set of groups will be studied, namely PIBs. These groups are often a combination of paid workers and volunteers with access to comprehensive networks and potentially extensive influence. They have worked together, often informally for many decades, and for some, formally through the ITABs. PIBs can work across and within all industries, they represent capital, labour, government, professional interests and community interests. This in itself is an indicator of their diversity of interests, of culture, of historical trajectories, values, structures and internal policies and procedures.

To expedite the study, Tasmanian PIBs have been selected. As an easily identifiable state and region, Tasmania offers unique opportunities for exploring the environs in which PIBs operate.

**Why study diverse groups working together?**

An appreciation of the potential for diverse groups to work together successfully is inherently important to addressing many of the social, political, economic and environmental issues of the day and is at the heart of this study. An increasing range of groups are required to grapple with a broadening focus as a means of meeting environmental challenges, developing sustainable futures and achieving their objectives (see for e.g. OECD 2001; Smyth and Cass 1998). Business, unions, community groups and government often have very different motivations, histories, experiences and even ideologies, and as such their interpretation of events, their focus can be very different.

For policy makers, for professions and others, there is a need to take into account the increasing expectation that diverse groups have a right to be part of decision making processes. This is a fundamental change in the ways in which policy makers, and professions are required to be accountable to their decision making (Taylor 1995).

**2002**

Through a study of how diverse groups, such as industry bodies, work together, industry learning is explored using Activity Theory as a model through which to analyse tensions and contradictions. It is the working through of these tensions and contradictions that leads to learning. While there is a considerable body of literature on groups working together, firms working together, networking, collaboration, cooperative activity and
teamwork there is very little literature on diverse groups such as industry bodies working together. There is even less literature on activity theory and its application to this issue.

Activity Theory is a tool for exploring the tensions and contradictions evident in any group working together and the learning that takes place in the process. It takes into account the different tools each group uses, their cultural (as in history of experience, language, stories and so on) differences, the formal and informal rules and conventions each party brings to what is being worked on and the division of tasks and distribution of power. A basic principle of activity theory is that mediated artefacts are a critical tool through which communication and the development of shared understandings takes place. Activity theory seeks to understand the processes and identify contradictions, both obvious and underlying, through the current focus, or object, of the group.

In this study the shared object between the industry bodies is skills development in a fledgling industry of Information and Communications Technology (ICT) Industry. Early data collection indicates there are considerable tensions between the type of skills required, the ways in which such skills are developed and the formal VET and higher education systems.

A case study methodology is being employed, using interviews, document analysis and observations. Industry groups range from the professional body which represents the individual professional interests of some in the industry, the employer organisation, the Industry Council (government advisory body), Other government agencies, Intelligent Island, the Industry Training Advisory Board which has representatives from employers, unions and government, and a plethora of other industry bodies in this sunrise industry.

**Research Question:** In what ways does activity theory assist, or otherwise, our understanding of the ways in which diverse groups, such as industry bodies, work together.
APPENDIX 3: Summary of Documents
Relating to Cluster
(names of individuals removed)

Marine Cluster
Minutes of steering c’ttee to discuss IT & GIS-related spin-offs from Antarctic Southern Oceans Fisheries Oceanography studies Inaugural meeting XX1 14 May 2002, Lord Mayor’s Rooms Town Hall Hobart.
Chaired by NAME in the absence of NAME. NAME summarised 2 briefs – a background paper distributed May9th produced by NAME, identifying the potential to boost the industry, listed institutions that could be involved, imperative of industry research institution collaboration, some objectives and listed some interested individuals.
Second brief tabled at the meeting written by NAME, a brief on geographic clusters, exploring the concept of geographic clusters for industry development around scientific endeavour; relevance to Hobart; aims and model of such clusters and steps in implementing such a cluster.
Draft of ‘Funding the proposed Information Technology Science Industry Cluster – Seeking $150,000 in seed money from the Gov, II and similar bodies with some contribution from the private sector, including in kind; need to identify which institutions and private companies will be involved, what they can contribute and what they expect to get out of their involvement. Purpose of cluster – to encourage the definition and implementation of innovative projects, especially collaborative projects that will accelerate the development, demonstration, promotion and diffusion of E-business strategies, applications and services.
Initiative to be driven by a steering c’ttee – lists their role and tasks
List of criteria that projects will need to meet with an emphasis on work being undertaken in Tasmania, increased efficiency and productivity.
Headers for applications for support by the Cluster
Provides a model format for seeking funding form the II or other potential funding bodies

TasIT bulletin XX38 24th September 2002
President report s on the marine Cluster progress. In May 2002 Following a meeting between NAME, and NAME an invitation was sent to a preliminary meeting to reps. Of the UTAS, AAD, CSIRO, other science orgs., AURISA, HCC, TasIT. 6 months later there is funding form DED to run a seminar in November. Support and interest lately form II, In-tellinc DED etc.

Email dated13 8 2002 from TasIT (NAME) to the group – see email Circulated responses to the cluster proposal – positive with added suggestions about eg getting ‘the money people involved’ as a priority, need to include access to IP specialist lawyers, other ideas, identifying stakeholders – further exploring this (see note from NAME)
Email 30 October 2002
Invitation issued from TasIt to attend a Marine Science ICT Cluster workshop half day on Thursday 7 November to develop a common understanding of the opportunities that exist for the 2 sectors to collaborate, determine the contribution of the participating members and identify the commercial outcomes that could be achieved. Proposal attached. DED (NAME) funded the workshop, providing professional facilitation and encouragement.

Email to NAME from II (NAME) 7 Feb 2003
Setting up a meeting with IT-Test consortium Brian hardy who ‘is very interested in the developing Antarctic Marine Science ICT cluster project. Meeting include NAME from DSD.

Minutes of Meeting XX13 of Steering Committee to promote cluster development around IT, GIS-related & other spin-offs from development of IP in Antarctic Southern Oceans Fisheries Oceanography studies. 26 March 2003
KPMG to conduct a capability and opportunity audit – report on their progress (just begun)
TPAC technology diffusion program opportunity to showcase nationally our wares; issues of formal collaboration with University, IP issues and advise on this from In-tellinc, position papers to be developed for Financial control, governance, Marketing, membership IP. Information about new consortiums being formed in the field.

Attached to minutes above are notes entitled: networking within the Marine Science ICT Cluster – 27 March 2003 (put together by Dick Friend)
Capability and Opportunity Audit commissioned by DED on behalf of the Cluster and funded by II is being conducted by KPMG, ‘who we understand seek to identify some quick win opportunities for the cluster’
A list of activities and projects is given as a result of networking within the cluster. These include research projects involving honors students with industry as a result of Prof Sale’s involvement e.g.s of parallel activities taking place without knowledge of various parties until introduced to each other by the cluster, list of research interest identified through the development of the cluster database and list of companies introduced on the database, including a brief summary of their activities.

Email from NAME (project manager, investment trade and development DED) to NAME 28 March 2003 minutes from steering C’ttee Timeframe of project plan confirmed, NAME (KPMG) to ensure the survey captures all potential respondents and to arrange communication with institutional respondents, discussion of survey tool IP, identification of participants for pilot, and data base tool.
Minutes of Meeting XX14 of Steering Committee to promote cluster development around IT, GIS-related & other spin-offs from development of IP in Antarctic Southern Oceans Fisheries Oceanography studies. 7 May 2003

Capability and opportunity audit is being circulated, with some responses in.

Formalising the cluster position papers circulated previously were adopted with amendments (a couple were deferred and another received) on:
- Overview – A cooperative approach; Governance, Financing and Budget, IP, responsibilities of Directors and Code of Conduct. (Many were written or co-written by NAME.) (see photocopies for papers)
- Letter form Building and construction ITAB with a draft proposal for a Marine engineering, tourism, language, education and technology centre with possible French Gov. support, asking for support
- Tas Science and Technology Industry Plan – draft and seeking feedback forum date.
- Dick resigns form his volunteer role- meeting convenor, minutes, agenda and database)
- Next meetings; 28 May with major partner institutions to brief them and explore membership options and early June meeting with all stakeholders to receive interim KPMG report of audit and formally endorse the proposed trading cooperative structure.

Email 6th June to Kevin from NAME circulating the KPMG report

KPMG May 2003, Marine ICT industry cluster Phase 1: Survey findings, DED (draft)
The cluster is made up of many micro orgs. And 3 R&D orgs – CSIRO, AAD and ITAS; there is medium to high degree of willingness among respondents to join the cluster. Respondents are concerned about IP and governance issues of the cluster.
CSIRO has its own commercialisation unit and prefers to use its own resources for commercialisation; AAD has 3 possible projects does not see commercialisation as part of its activities other than occasionally; UTAS has over 100 projects, has its own commercialisation and IP units. Need an audit of these projects. There is a need for a wide variety of services form the cluster, particularly commercialisation, sales and marketing, distribution and logistics business planning, funding and software development.
Recommendations: that an audit be undertaken of the UTAS projects to determine the complexity of the IP encumbrances, that phase 2 (workshop and comprehensive report) not proceed until this is done, that stakeholder concerns about the proposed organisational corporate structure be evaluated further, ensure there is no overlap between the Marine cluster and the Software development cluster.

Early August 2003 invitation sent out to attend a meeting to form a trading cooperative (suggested as the most appropriate and democratic means of organising the marine cluster).
Formalising the Marine Science Cluster invitation to participate in the Jasus ICT Cooperative meeting Friday 15th August 4.00pm Lord Mayor’s Court Room.
Issued by NAME and NAME
APPENDIX 4: INTERVIEW QUESTIONS

STAGE ONE

Industry Learning: Interview 1 Questions

1. Contextual questions:
   * History of involvement within the structure (including any different roles)
   * Your views of the role of the ITAB
   * How would you describe the main characteristics of the industry?
   * How does the ITAB work? (who are the representatives; structure; meeting format etc.)

2. Why does your organisation participate in the ITAB?

3. How would you describe the role of your organisation within the ITAB?
   What sort of issues have you brought to the ITAB from your organisation? What happened?
   How did your organisation identify these as issues?

4. How do you disseminate information from the ITAB to your members?
   How do they identify issues to you?
   Please give examples

5. In what ways could organisations and individuals benefit from accessing VET?

6. Can you tell me about the highs and lows of working on the working group/division/board?

7. What sort of information do you/your working group/division/board receive from the national ITAB?
   What information do you pass onto the national ITAB?
   In what ways does the national ITAB support the work done by this working group/division/board?

8. Would you tell me about some thing/event/action that happened within the ITAB or as a result of ITAB involvement that your organisation/you view as successful?

9. Would you tell me about some thing/event/action that happened within the ITAB or as a result of ITAB involvement that your organisation/you view as not so successful?

10. Would you describe your relationships with other members and/or organisations of the working group/division/board? (length of time known each other, any external networking contact, what you value about their contribution, what might impede the work of the working group/division/board?)

11. What things has the ITAB been involved with or done that you would describe as innovative? What makes them innovative?
12. Are there examples of innovative practices that you are aware of, in this industry? What makes them innovative?

13. In what ways do you believe the ITAB can assist in developing and supporting innovation?

14. What directions do you see the industry headed for in the future?

15. The ITAB structure has been the only ongoing tripartite arrangement. In what ways do you think such an arrangement has supported or held back current and future industry directions?

16. What role do you believe the ITAB has to play in addressing these issues (points raised in questions 13 and 14)? Would anything need to change in order to achieve this?
Stage Two

Interview Schedule 2002

Diverse groups such as industry bodies working together

1. Tell me about this organisation: How long has it been operating, how and why it started, its purpose, its history, its structure.

2. Since its beginning what sort of activities has the organisation been involved with or initiated? Examples please

3. The following questions relate to one or two issues discussed in question two.

<table>
<thead>
<tr>
<th>Your organisation</th>
<th>The group of organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was/is your organisation’s understanding of the issue?</td>
<td>How did the group understand the issue?</td>
</tr>
<tr>
<td>Why was this an issue for the organisation?</td>
<td>Why was it an issue for the group?</td>
</tr>
<tr>
<td>How did the organisation address the issue? What ‘tools’ (e.g. strategies, problem solving approaches means of communication etc. ) were used?</td>
<td>How did the group address the issue? What ‘tools’ (e.g. strategies, problem solving approaches means of communication etc. ) were used?</td>
</tr>
<tr>
<td>Were there different views within the organisation? How were these worked through?</td>
<td>Were there different views between groups members? How were these worked through?</td>
</tr>
<tr>
<td>What protocols or formal or informal rules does your organisation have for working this type of issue, or working with other organisations?</td>
<td>Tell me about the discussions that were had about how the group would work together.</td>
</tr>
<tr>
<td></td>
<td>Which organisation did what tasks and why?</td>
</tr>
<tr>
<td></td>
<td>Were some organisation’s more influential than others? In what ways? Why do you think was the case?</td>
</tr>
<tr>
<td>What was the outcome? What does your organisation think about the outcome?</td>
<td>What was the outcome? What did the group think about the outcome?</td>
</tr>
<tr>
<td>What would your organisation do differently next time?</td>
<td>What do you think the group would do differently next time?</td>
</tr>
</tbody>
</table>

Are there other stories/examples of this group or various combinations of organisations working together?
### Stage Three

**Interview Questions**

<table>
<thead>
<tr>
<th>Question</th>
<th>Theoretical aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. What was your organisation’s purpose in developing/being involved in the development of a Marine Cluster?</strong></td>
<td></td>
</tr>
<tr>
<td>a) Why a Marine Cluster?</td>
<td>Follow the object – what was the initial motive and need? What needs or new horizons was the organisation trying to meet or look for? Identify and/or confirm (from initial analysis) contextual conditions</td>
</tr>
<tr>
<td><strong>2. How will the cluster assist Tasmanian industry given that it is made up of micro firms and only a small (but growing) number of firms have national and international markets?</strong></td>
<td></td>
</tr>
<tr>
<td>* What sort of relationships between firms and customers would you say a cluster encourages?*</td>
<td></td>
</tr>
<tr>
<td>* What sort of labour market arrangements does a cluster need? Does this fit with what is in place in the Tasmanian ICT industry? How?*</td>
<td></td>
</tr>
<tr>
<td>* Given the KPMG finding that skills sets such as marketing, distribution etc. are underdeveloped in the Tasmanian industry, how will a cluster assist?*</td>
<td></td>
</tr>
<tr>
<td><strong>3. In what ways did your organisation’s initial purpose develop and change? (discuss history of involvement)</strong></td>
<td></td>
</tr>
<tr>
<td>a) Why?</td>
<td>Follow the object as it evolves Consumption and distribution of contextual tools – ways of thinking - dominant discourses; access/distribution of these tools – rules and division of labour</td>
</tr>
<tr>
<td><strong>4. How would you describe what everyone’s (the whole group/collective) understanding of the purpose was at the beginning, and how did this evolve and change?</strong></td>
<td></td>
</tr>
<tr>
<td>Why do you think these changes took place? For example: different sets of knowledge and skills as different organisations became involved; institutional arrangements, including funding access; access to information etc.</td>
<td></td>
</tr>
<tr>
<td>b) Did the language used to talk about the cluster and its development change from when you first met to now?</td>
<td></td>
</tr>
</tbody>
</table>

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239
<table>
<thead>
<tr>
<th>Question</th>
<th>Access to power and influence (division of labour); access to tools, community of practice, institutional discourses, rules, tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. a) At [nominate a particular time/stage] how were decisions made, and tasks allocated? Why?</td>
<td>How the object is mediated by rules, division of labour and community.</td>
</tr>
<tr>
<td>b) Who was involved at this stage? What difference do you think the involvement or non involvement of [organisation/s] made? Why?</td>
<td></td>
</tr>
<tr>
<td>6. Tell me about the unexpected things that happened as you were working on the cluster? Positive and negative</td>
<td></td>
</tr>
<tr>
<td>7. Tell me about what was frustrating about the process? For example:</td>
<td></td>
</tr>
<tr>
<td>* Policies/programs that were in place that hindered?</td>
<td></td>
</tr>
<tr>
<td>* Time frames of different organisations</td>
<td></td>
</tr>
<tr>
<td>* Different skill sets</td>
<td></td>
</tr>
<tr>
<td>* Different understandings of what you were developing?</td>
<td></td>
</tr>
<tr>
<td>* Rules of organisations that limited or slowed their involvement?</td>
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<tr>
<td>8. Tell me about factors that assisted the development of the cluster? E.g.:</td>
<td></td>
</tr>
<tr>
<td>* Policies/programs that were in place</td>
<td></td>
</tr>
<tr>
<td>* Existing networks and relationships (e.g. monthly ‘breakfasts’ with Intelligent Island, TasIT and Australian Computer Society)</td>
<td></td>
</tr>
<tr>
<td>* Rules of organisations that allowed them to make decisions quickly or to participate in such a development</td>
<td></td>
</tr>
<tr>
<td>9. Could the cluster have ‘got up’ five years ago? Why?</td>
<td>Contextual conditions - institutional arrangements, discourses, skills.</td>
</tr>
</tbody>
</table>
UNIVERSITY OF TASMANIA ETHICS COMMITTEE
(HUMAN EXPERIMENTATION)

APPLICATION TO UNDERTAKE AN INVESTIGATION INVOLVING HUMAN SUBJECTS

Please type this application and return it to the Secretary, University Ethics Committee
(Human Experimentation), Office for Research, Hobart Campus.

Note: Investigators who wish to conduct clinical trials (studies which aim to find out if a treatment or diagnostic procedure benefits patients) must provide additional information to that listed below. See "NHMRC Statement on Human Experimentation" for details.

1. TITLE OF PROPOSED INVESTIGATION

Industry Learning: What supports and/or inhibits learning at the industry level?

2. APPLICANTS (Show Chief Investigator first - all applicants to sign on page 4)

<table>
<thead>
<tr>
<th>Title/Name</th>
<th>Position</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helen Bound</td>
<td>Masters by Research student</td>
<td>Department of Secondary and Post Compulsory Education</td>
</tr>
</tbody>
</table>

3. TEACHING/RESEARCH

Is the proposed investigation for teaching or research?
Research

4. AIMS

Please give a concise description of the aims of the investigation.
The purpose of this research is to investigate what supports and/or inhibits learning at the industry level, that is learning within the Industry Training Advisory Board (ITAB) structure of ITAB, unions and employer bodies. The specific aims include:

- to what degree the workings of each of the ITAB tripartite arrangements demonstrate a learning culture within their own practice;
- to explore how contextual factors, dominant discourses, climate and culture enhance or inhibit knowledge flow and knowledge creation and its contribution to innovation.

5. **JUSTIFICATION**

What are the advantages to be gained from this study?

Industry learning is a concept which arose from a Centre for Research and Learning in Regional Australia (CRLRA) audit of future learning needs for industry. Peak employer bodies, unions and Industry Training Advisory Boards (ITABs) were interviewed to identify changes, future challenges and level of satisfaction with current training arrangements. This research found a considerable uneveness across industries in response to the current economic and political environment. Some industries exhibited a problem solving culture and a climate of cohesiveness; others spoke of deep tensions. The research also identified knowledge flow between ITABs and their constituents was limited in many industries, particularly in regional Australia.

The nature of knowledge flow and creation is influenced by the climate and culture created within the ITAB arrangement, and the context within which the ITAB is situated. These contextual issues include: globalisation, dominant discourses, policy, and labour market arrangements. It is contended that just as learning cultures within organisations are important to the future development of the organisation, so is the development of a learning culture within the ITAB arrangement. The development of a learning culture within the tripartite arrangement has the potential to impact on the development of learning cultures throughout the industry.

To impact on future direction of industry requires a multiplicity of factors to act together. In part, these factors include the ways in which knowledge is created, what knowledge is created, how it is distributed and how it is used to be innovative. Innovation and the creation of new knowledge are key factors for success in responding to our ever changing environment. Structural factors such as tripartite arrangements have a potentially critical role to play in the directions chosen by Australian industries.

**Note:** The only ongoing tripartite arrangement that has been now been operating for close to a decade, is centred around the Industry Training Advisory Boards (ITABs). The ITAB represents government and acts as the coordinating body; unions represent the interests of labour and peak employer bodies represent the interests of capital. ITABs grew from other existing arrangements in response to the call for the development of a `clever
country’. These ITAB structures are the responsible bodies for the development and implementation of accredited Vocational Education and Training (VET). This tripartite arrangement has the potential to, and in part already does, assist industry in the development of knowledge creation, flow and distribution. The ITAB structure is the central structure to be explored in this research and in particular, its role in knowledge creation, flow and distribution.

6. **BRIEF DESCRIPTION OF INVESTIGATION**
   (A brief description, preferably a single sentence, is required by the NHMRC)

To investigate what degree the workings of each of the selected Industry Training Advisory Boards (ITABs) demonstrate a learning culture within their own practice by exploring how contextual factors, dominant discourses, climate and culture enhance or inhibit knowledge flow and knowledge creation and its contribution to innovation. Qualitative data will be collected by interviewing ITAB members, union and peak employer body representatives. This will be supported by collecting secondary source material to develop a profile of the industries studied and a discourse analysis of relevant policy.

7. **EXPECTED DURATION OF PROJECT**
   From January 2000 to December 2001

8. **FUNDING**
   Will this investigation proceed only if an external grant is obtained? No

9. **REVIEW OF ETHICAL CONSIDERATIONS**
   Has this schedule previously been submitted to the Ethics Committee? No

10. **RESEARCH PROCEDURES**
    Give details of the experimental plan and procedures which will be followed.

    Two industries have been selected to study. Data to build industry profiles and build an understanding of policy contexts and discourses will initially be collected across the selected industries at a state and national level. Interviews will then proceed on an industry basis.

    1. Collect statistical and other data to build a profile of each industry at state (Tasmania only) and national level. Sources will include Australian Bureau of Statistics (ABS) data; ITAB reports, government department reports and so on.
2. Analyse and write up these profiles, including a brief comparison between the national and Tasmanian profiles.

3. Collect policy documentation on industry and VET (national and state levels where applicable). Conduct a discourse analysis of these policies and write these up.

4. Contact ITABs, unions and employer bodies within the selected industries (by phone and then letter – see Appendices A and B) and invite them to participate in the research. Copies of the interview questions for the first interview and observation schedules will be included with the letter (see Appendices C and D)

5. Conduct interviews.

6. Collect minutes of ITAB meetings plus data from each organisation to assess evidence of information flow, implementation, knowledge creation and innovation.

7. Observe a minimum of two meetings of each ITAB, using the observation schedules of cultural and climatic factors in the development - or otherwise – of information flow and of knowledge creation and innovation.

8. Analyse interview data for evidence or otherwise of information flow, knowledge creation and innovation. Compare this analysis across industries and assess what encourages and what inhibits ‘industry learning’.


10. Arrange second interview time with participants, providing them with a copy of the interview schedule prior to the interview.

11. Analyse and write up a report for each of the industry ITABs.

12. Submit this to them for comment. Offer to conduct a seminar on the findings.


14. Submit thesis to the participating ITABs.

15. Make necessary adjustments and submit thesis.

11. **SUBJECTS AND SELECTION**

   Intended experimental group (age group, sex, state of health, and other special characteristics, eg. children, students, persons in dependent relationships):
Representatives from Industry Training Advisory Boards (ITABs); relevant unions and employer bodies from the community services and information technology industries.

Selection procedure:

The two industries listed above have been selected on the basis of purposeful sampling. They have very different histories, are in different phases of growth, have different dominant labour market arrangements and differing philosophies.

12. SOURCES OF PERSONAL INFORMATION

Personal information is information which allows the identification of an individual.

Are you obtaining data containing personal information from any government agency? No

If YES, state (i) the names of these agencies and (ii) the nature of this data.

Explain the justification for obtaining personal information.

13. POTENTIAL RISKS

Please describe any possible physiological or psychological risks associated with this investigation.

No potential risks are identified.

14. PRE AND POST CONTACT

Describe the steps to be taken to explain the procedures to subjects and, if appropriate, procedures which will establish the well-being of the subjects when the investigation is concluded.

- Initially, procedures will be briefly outlined in the first contact made by phone
- This will be followed by a written explanation (see Appendices A and B) of the research procedures and and include copies of the first interview schedules and observation schedules (Appendices C and D).
- Interview times will be organised with participants
- Prior to commencing the interviews, the researcher will verbally explain the procedures, including the interviewee’s right to stop the interview at any stage and gain written consent (see Appendix B).
• Collect copies of minutes of meetings and other relevant information. Arrangement to do this will be made at the first interview.

• Suitable times will be arranged with ITAB representatives (these include unions and employer bodies) to observe their meetings.

• Observations will be conducted. Immediately prior to the observation taking place, I will verbally check with participants that they remain agreeable to being observed (consent having been gained prior to the interview, some time earlier).

• Participants will be contacted by phone to arrange suitable times for the second interview. Copies of the interview schedules (Appendice E) will be faxed, emailed or posted prior to the interview.

• Following interviews and observations, each ITAB will receive a general report of what inhibits and enhances learning within this grouping.

• Some weeks following the report, the ITAB will be contacted to ask if they wish for a seminar to be conducted to discuss the report.

• Copies of the thesis will be circulated to participants, prior to submission.

15. REMUNERATION
Will any financial remuneration or other reward be offered to subjects for their participation, other than reimbursement of out of pocket expenses?
No

16. CONFIDENTIALITY OF RECORDS
How will the confidentiality of records be maintained?

The transcripts of interview will contain no identifying data other than broad demographic categories. This data will be collated. Audio-tapes will be erased at the conclusion of the research, and transcripts will be stored in a safe place in accordance with University ethics procedures. Observation notes will also have only broad demographic categories, and will be stored in a locked filing cabinet. Any electronic files will be password protected.

17. DRUG USE STATUS
Are drugs directly or indirectly involved with the procedures?
No

If YES, please give details, including information on known or suspected adverse effects.
18. **BLOOD OR TISSUE SAMPLING**  
Do the procedures involve blood or tissue sampling?  

No  

If YES, please give details.

19. **OTHER ETHICAL ISSUES**  
Are there, in your opinion, any other ethical issues raised by this investigation?  

No  

If YES, give details.

20. **DRAFT CONSENT FORM**  
A sample draft consent form is attached (appendix B).

21. **STATEMENT OF SCIENTIFIC MERIT**  
The **Head of Department** is required to sign the following statement:  

This proposal has been considered and is sound with regard to its merit and methodology.  

.................................................................  

.......................  

(Signature of head of department)  
(Date)

22. **CONFORMITY WITH NHMRC GUIDELINES**  
The **Chief Investigator** is required to sign the following statement:  

I have read and understood the NHMRC "Statement on Human Experimentation and Supplementary Notes".  
I accept that I, as Chief Investigator, am responsible for ensuring that the investigation proposed in this form is conducted fully within the conditions laid down in the NHMRC Statement.  

.................................................................  

.......................  

(Signature of chief investigator)  
(Date)

23. **SIGNATURES OF OTHER APPLICANTS**
OFFICE USE ONLY
INTERIM APPROVAL

Chairman  Date  Approved for period .......... to .......... 

FINAL APPROVAL
Chairman  Date  
Approved for period .......... to .......... 

(Signature)  
(Date)
STAGE ONE

Helen Bound  
GPO Box 252-66 
Hobart 7001  
Tasmania 
Ph: (03) 6226 7678  
Fax: (03) 62262569

Dear

I am requesting your participation in investigating what supports and/or inhibits learning within the Industry Training Advisory Board (ITAB) structure. Specifically I am interested in researching:

- to what degree the workings of the (name of industry) ITAB structure demonstrates a learning culture;
- and to explore how contextual factors, dominant discourses, climate and culture enhance or inhibit knowledge flow and knowledge creation and its contribution to innovation.

I am a Masters by Research (Education) student with the University of Tasmania. To better understand the learning culture within the ITAB structure, I am inviting ITAB personnel, union and employer body representatives to take part in a 45 minute, taped interview. I am also seeking permission to sit in on and observe a number of ITAB meetings. With your permission, these observations would be followed by another interview. From these interviews and the observations I will explore the culture and climate of the (name if industry) ITAB. As part of the data I have also developed a profile of the industry, and a discourse analysis of relevant policy.

I will provide the ITAB grouping with a report of my findings and am happy to conduct a seminar for this purpose and/or to investigate ways in which the information could be used strategically. In addition I will provide a copy of my thesis to the ITAB grouping for comment, prior to submitting my thesis.
for marking. It will be an opportunity to gain the views of an independent observer on effective learning strategies used, which the group may wish to develop further. Your participation in the research will provide an opportunity to learn more about what works successfully and what inhibits learning and the development of innovation within the industry at this level. Confidentiality will be protected and there will be no means of identifying participants. Participation is entirely voluntary and you may withdraw at any time.

**How will the research be conducted?**

I am inviting two industries to participate in this research: the information technology industry and the community services industry. ITAB personnel, representatives from employer bodies and unions are crucial to the research. Participating in the research will involve taking part in two taped interviews and agreeing to me observing several ITAB meetings. Prior to observing these meetings, I would like to peruse copies of past minutes and other relevant documentation. Participation is entirely voluntary. Steps have been carefully built into the research process to ensure confidentiality of those interviewed. No-one will be identifiable in the reports from this research. I have set out the steps involved in contact with you below:

- I will contact you by telephone to ask if you are interested in participating in the research. If the answer is yes, we will arrange a time that best suits you, for a taped interview. I expect the interview to take approximately 45 minutes.

- I have included a copy of the interview questions, so that you may peruse the questions, if you wish, prior to the interview.

- Following the interview, I will contact you again, through ITAB personnel, to make arrangements to observe some two to three ITAB meetings.

- I will contact ITAB personnel to discuss the reading of minutes of previous minutes and any other relevant documentation. This will be done prior to the observations.

- I will again contact you to make arrangements for the second interview, of similar length to the first interview. As before, I will send you a copy of the interview questions prior to the interview.

- As part of the process I would like to send you a report on my findings for your industry, once the findings are collated and analysed. Individuals will not be identifiable within the report. Confidentiality will be maintained at all times.

- Some weeks following your receipt of the report, I will contact the ITAB personnel to discuss with them the possibility of a seminar to discuss the
findings and their application.

- A copy of my thesis prior to submission for marking, will also be available.

I know you are a very busy person and very much appreciate access to your time.

If you would like to learn more about the research, please contact me

**Helen Bound**

Phone: (03) 6226 7678

Email: Helen.Bound@utas.edu.au

If there are any concerns of an ethical nature or complaints about the manner in which this project is conducted, please contact the Chair or Executive Officer of the University of Tasmania Ethics Committee (Human Experimentation). The Chair in 2000 is Dr Margaret Otlowski, Phone: (03) 62267569 and the Executive Officer is Ms Chris Hooper Phone: (03) 62262763.

Thank you in advance for taking the time to participate in this research.

Yours sincerely

Helen Bound

Date ....................
Dear

Little research has been undertaken on industry bodies and how they work together. I am a Masters by Research student, and am requesting your assistance with my research into this topic, in particular an hour of your time for a taped interview. Name of organisation is one of a number of peak bodies in the Information Technology Industry I am giving particular emphasis to in a case study approach.

The objectives of the study are to:

- Identify the shared tools (for example mental models such as ways of thinking about an issue, physical tools) used and how and why they are used
- Investigate the rules and conventions, formal and informal used by peak industry bodies and how they change
- Investigate the different perspectives of each peak industry body
- Investigate task allocation and the distribution of power within peak industry body groupings
- Investigate learning and innovation that takes place as peak industry bodies work together.

I am using a case study approach and plan to interview long term members of each peak industry body in the IT industry. Interviews will focus on a history of the body and its activities and one to two focus areas or issues the peak industry body is currently, or has,
worked its way through – or not. I have attached a list of interview questions which are representative of the type of question we will discuss in the interview. In addition I would appreciate access to documentation such as copies of rules and procedures, reports, minutes, and submissions. I will use these to do a text analysis. I also wish to observe some informal and/or formal exchanges between peak industry bodies within the industry.

If there are any concerns of an ethical nature or complaints about the manner in which this project is conducted, please contact the Executive Officer of the University of Tasmania Ethics Committee (Human Experimentation), Amanda Mcaully on (03) 62262763.

Yours sincerely

Helen Bound
Dear [name],

I would like to invite you to participate in a research project looking into collaboration between industry bodies in the ICT industry and the role of context in this collaborative activity.

I am a PhD student at the University of Tasmania, Faculty of Education and the project is the subject of my PhD thesis.

In 2002 I interviewed a number of people from the range of industry bodies in the Tasmanian ICT industry, and gained general information about collaborative activity between these bodies. For this final stage of the project, I would like to focus on the Marine Cluster, and the industry bodies involved in the development of the Cluster.

As an initiative driven by the industry, the Marine Cluster is an exciting project reaching across institutions. I believe the Cluster has the potential to develop institutional arrangements either not previously in place or that were tenuous in their linkages. For these reasons, it is particularly relevant to my study as the Cluster has and will influence context such as institutional arrangements, and industry development in the State.

Participation in the project will involve taking part in a 40 to 60 minute taped interview between yourself or a selected representative and me, arranged at a time and place convenient to you. I will contact you to make these arrangements. Please find following an information sheet about the project and a copy of the interview questions, which will form the basis of the interview/discussion.

I would be very happy to present my findings to your organisation, or at a session involving all industry bodies.

Yours faithfully,
Helen Bound
APPENDIX 7: CONSENT FORMS

STAGE ONE

STATEMENT OF INFORMED CONSENT FOR RESEARCH
INDUSTRY LEARNING

"I have read the information about the project and any questions I have asked have been answered to my satisfaction. I agree to participate in this investigation (interviews and observation of ITAB meetings). I understand that I may withdraw at any time. I agree that research data for the study may be published provided that I cannot be identified as a subject and that information of a sensitive nature is protected and remains confidential."

"I understand that this interview may be taped and that the tape will be erased at the conclusion of the study."

“I understand that any notes made by Helen Bound as she observes us in meetings, will be kept confidential, and that I will not be identified in any way, in any report or other publication.”

Signature of participant ...................................................

Date ...........................................

"I have explained the purpose of this research and the implications of involvement in it to the participant. I believe that the volunteer understands the implications of participation and that they consent to participate."

Helen Bound
Date ..................
STAGE TWO

STATEMENT OF INFORMED CONSENT

Diverse groups such as Industry Bodies working together

1. I have read and understood the letter outlining the research.
2. The nature and possible effects of the study have been explained to me.
3. I understand that the study involves the following procedures:
   An interview about this organisation and how it interacts with others.
4. I understand that there are no foreseeable risks or discomfort.
5. I understand that all research data will be treated as confidential.
6. Any questions that I have asked have been answered to my satisfaction.
7. I agree that research data gathered for the study may be published provided that I cannot be identified as a subject.
8.* I agree to participate in this investigation and understand that I may withdraw at any time without prejudice.

Name of subject
..................................................................................................................................

Signature of subject ......................... Date ..............................
..................................................................................................................................

I Helen Bound, have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of investigator
..................................................................................................................................

Signature of investigator  ......................... Date
..................................................................................................................................
STAGE THREE

Context and collaboration in the Tasmanian ACT industry

CONSENT FORM

1. I have read and understood the 'Information Sheet' for this study.

2. The nature and possible effects of the study have been explained to me.

3. I understand that the study involves a taped interview lasting approximately 40 to 60 minutes.

4. I understand that all research data will be securely stored on the University of Tasmania premises for a period of 5 years. The data will be destroyed at the end of 5 years.

5. Any questions that I have asked have been answered to my satisfaction.

6. I agree that research data gathered for the study may be published.

7. I understand that my identity will be kept confidential and that any information I supply to the researcher(s) will be used only for the purposes of the research. However - for those participants who hold an official position or title - I understand that I may be identifiable due to my official position.

8. I agree to participate in this investigation and understand that I may withdraw at any time without any effect, and if I so wish, may request that personal data gathered be withdrawn from the research. (Note: in this project no personal data will be gathered).

Name of participant __________________________________________

Signature of participant __________________________ Date ____________

________________________________________________________________________

9. I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of investigator __________________________________________

Signature of investigator __________________________ Date ____________

________________________________________________________________________

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APPENDIX 8: CODING TREE

Q.S.R. NUD.IST Power version, revision 4.0.
Licensee: Faculty of Education.


************************************************************
***************
(1)                     /Case data
*** No Definition
************************************************************
***************
(1 1)                   /Case data/TasIT
*** No Definition
************************************************************
***************
(1 2)                   /Case data/ACS
*** No Definition
************************************************************
***************
(1 3)                   /Case data/Industry Council
*** No Definition
************************************************************
***************
(1 5)                   /Case data/ITAB
*** No Definition
************************************************************
***************
(1 6)                   /Case data/Government
*** No Definition
************************************************************
***************
(1 7)                   /Case data/Intelligent Island
*** No Definition
************************************************************
***************
(2)                     /Subject
*** No Definition
************************************************************
***************
(2 1)                   /Subject/Beliefs
*** No Definition
************************************************************
***************
(2 2)                   /Subject/Role
*** No Definition
(3 8 4) /Object/Marine Cluster/II
*** No Definition
******************************************************************************

(3 8 5) /Object/Marine Cluster/TasIT
*** No Definition
******************************************************************************

(3 8 6) /Object/Marine Cluster/Firm1
*** No Definition
******************************************************************************

(4) /Tools
*** No Definition
******************************************************************************

(4 1) /Tools/programs
*** No Definition
******************************************************************************

(4 2) /Tools/Projects
*** No Definition
******************************************************************************

(4 3) /Tools/Ways of thinking
*** No Definition
******************************************************************************

(4 3 1) /Tools/Ways of thinking/Values
*** No Definition
******************************************************************************

(4 4) /Tools/Knowledge
*** No Definition
******************************************************************************

(4 4 1) /Tools/Knowledge/Cluster Definition
*** No Definition
******************************************************************************

(4 5) /Tools/Other
*** Definition:
Includes skills and capabilities
******************************************************************************

(5) /Division of labour
*** Definition:
Includes roles, power, allocation of tasks etc.
******************************************************************************
(6) /Rules
*** No Definition
******************************************************************************
******************************************************************************

(7) /Community
*** No Definition
******************************************************************************
******************************************************************************

(7 1) /Community/Identity
*** Definition:
Identity of the Activity System e.g. of TasIT, of Industry Council etc.
******************************************************************************
******************************************************************************

(7 2) /Community/Links
*** Definition:
Connections of links with other organisations etc.
******************************************************************************
******************************************************************************

(8) /Context
*** No Definition
******************************************************************************
******************************************************************************

(8 1) /Context/Mode of production
*** No Definition
******************************************************************************
******************************************************************************

(8 2) /Context/Institutional arrangements
*** No Definition
******************************************************************************
******************************************************************************

(8 3) /Context/Industry-geography
*** No Definition
******************************************************************************
******************************************************************************

(8 4) /Context/policy
*** No Definition
******************************************************************************
******************************************************************************

(8 5) /Context/political
*** No Definition
******************************************************************************
******************************************************************************

(8 6) /Context/Discourse
*** No Definition
******************************************************************************
******************************************************************************

(9) /Collaboration
*** No Definition
******************************************************************************
******************************************************************************
(9 1) /Collaboration/Production
*** Definition:
What the collaborative arrangement is producing
**********************************************************************

(9 2) /Collaboration/Networks
*** No Definition
**********************************************************************

(9 3) /Collaboration/Perceptions of other
*** No Definition
**********************************************************************

(9 4) /Collaboration/Interaction
*** No Definition
**********************************************************************

(9 5) /Collaboration/Participation
*** No Definition
**********************************************************************

(9 6) /Collaboration/Tools
*** No Definition
**********************************************************************

(9 7) /Collaboration/Cluster Dev. Process
*** No Definition
**********************************************************************

(D) //Document Annotations
*** No Definition
**********************************************************************

(F) //Free Nodes
*** No Definition
**********************************************************************

(T) //Text Searches
*** No Definition
**********************************************************************

(T 1) //Text Searches/TextSearch
*** Definition:
Search for 'IP', No restriction
**********************************************************************

(T 2) //Text Searches/TextSearch193
*** Definition:
Search for 'IP', No restriction
(T 3) //Text Searches/TextSearch194
*** Definition:
Search for 'test', No restriction

(T 4) //Text Searches/TextSearch195
*** Definition:
Search for 'persuasiveness', No restriction

(T 5) //Text Searches/TextSearch196
*** Definition:
Search for 'persistence', No restriction

(T 6) //Text Searches/TextSearch197
*** Definition:
Search for 'cluster', No restriction

(T 7) //Text Searches/TextSearch198
*** Definition:
Search for 'Queensland', No restriction

(T 8) //Text Searches/TextSearch199
*** Definition:
Search for 'company', No restriction

(T 9) //Text Searches/TextSearch200
*** Definition:
Search for 'small firms', No restriction

(T 10) //Text Searches/TextSearch201
*** Definition:
Search for 'micro firms', No restriction

(T 11) //Text Searches/TextSearch202
*** Definition:
Search for 'demanding customer', No restriction

(T 12) //Text Searches/TextSearch203
*** No Definition
(T 13) //Text Searches/TextSearch204
*** Definition:
Search for 'questions', No restriction

(T 14) //Text Searches/TextSearch206
*** Definition:
Search for 'facilitate', No restriction

(I) //Index Searches
*** No Definition

(C) //Node Clipboard - 'TextSearch206'
*** Definition:
Search for 'facilitate', No restriction
APPENDIX 9: EXAMPLES OF CODED DATA

Examples of data coded against nodes

**Example of a Report**
Q.S.R. NUD.IST Power version, revision 4.0.
Licensee: Faculty of Education.


******************************************************************************
**********
(4 3 1) /Tools/Ways of thinking/Values
*** No Definition
++++++++++++++++++++++++++++++++++++++++
+++ ON-LINE DOCUMENT: Marine_Cluster_firm1
+++ Retrieval for this document: 15 units out of 293, 5.1%
* 27_8_2004 5
++ Text units 69-71:
I. So when we talk about cluster what does that mean to you? 69
70
R. Um It means a group that’s going in the same direction. Part of making a cluster work is to not only make sure that the current membership has a clear idea of how its going and ?? doing very well at that at the moment, a common view of what we’re trying to achieve, there are differences about how and detail but that’s good because that encourages discussion and then you end up coming up with something better than you would have got than oh yeh we’ll do that. But we’ve got to be careful when we bring people in that we inculcate them in with our culture. We don’t want people coming in thinking well this is how I’m going to get 10 $5000 jobs in the next month. No you’re not, that’s not how it works. If you want to that go to another cluster, there’s nothing wrong with having a cluster based on that except I don’t think those clusters are sustainable because they just don’t generate enough money. 71
++ Text units 94-105:
I. What I find interesting too was the emphasis on the democratic nature, the fact that the Cooperative there are other possibilities of organisation and also that no one company can dominate 94
95
R. I wouldn’t have gone into it, if t had been a company structure where everybody had a few shares and there are shares which you issue over time. I wouldn’t have gone into that because 5 shares in a 100 is no interest, to gain influence you have to form alliances and parties umpteen factions and form sort of political interest. I think one the things that the Cooperative did was not only made it democratic, it depoliticised it. 96
97
I. Another option is to have a loose association which is my understanding of the learning cluster.

R. yes. The loose association to me um doesn’t have a long term, as association isn’t a commercial entity, an association is a bunch of people with a common interest or a common cause. It’s the Wilderness Society, all an association does it protects members from another in the group as far as legal liability goes, insurance all those everyday operational matters. And out of that you elect democratically a group who run the organisation. Most associations in the commercial world ??? a small groups of people get together and run it ands there is no democracy ???I think associations tend ot get dominated by a small group and ??? its not being negative, its that there’s only so many companies have got the energy, or time or the vision or whatever it is that motivates them to get involved in that level of activity. The new Health Association (an industry body) a good example where there relatively large membership as you get in a normal Association. I’m a member of TasiIT, I’m not on the Committee, never been on it, I don’t know what they are doing, what their directions is, I don’t feel engaged by it and I think that ‘s what associations are about, other than the Committee, the engagement factor is very low.  

I. So the Cooperative gives you both voice and possibilities.  

I. And levels of engagement.  

R. Hmm and ?? we could have done it as a company, but a company doesn’t expand and contract as easily. ??? a company has two problems one it doesn’t grow easily because every time you grow you dilute your influence away, obviously as you grow the Cooperative your influence goes as well but the company can also be bought up, can be traded so I can sell you my shares or half my shares and you buy half the shares off every other member of the company so you end up 45 or 55% of the Company which effectively means basically you go home you do as you are told and you have control that I don’t think is sustainable. ???
through which a lot of the development work was happening in the education Department. And you had a number of industries that were ??? in a way and really hadn’t done a lot of big contract work for the government. But what the open IT project provided was the opportunity for those companies to work together and to work for government in a really commercial way. People who were involved in at project tell me it was a struggle, you had companies who weren’t used to meeting deadlines, y’know, but they learnt and so you’ve now got these companies that have a strong ability to collaborate and all the learning that they have received from the demanding customer. And one of the things that I think the government has a bit forced to do is to force the development of science clusters and I don’t think the government shouldn’t be about trying to create clusters they should about potentially supporting emerging clusters. SO that’s the strength of the Marine Cooperative. But it needs to be just more than industry players you need to be thinking about your customers, your suppliers, your research and I don’t think we call this marine area a cluster because I don’t think that we’ve got all of those players involved. Whereas in the Education area I can see and in the emerging new health area I can see got to be seen that the clusters have to involve all of the players?? Not just the industry players.

R. So it’s a different sort of model. Potentially the Cooperative can work really well because I think that’s what we need to much more of to promote the commercialisation of research outcomes, you need to have a demanding industry saying ‘Look we need research conducted in this area because we can commercialise this, we see a market opportunity. And the conduit being so strong and having industry determining some of the research activity that is happening in research institutes is going to help. In fact the Australian Institute for Commercialisation is actually funding industry to working with SMEs to determine what it is they need R&D on. And then finding, matching marriage brokering, some institute within the Country that’s actually undertaking that research and then bringing the 2 together. They aren’t putting commercialisation money into the research institutes because the research institutes don’t have the know-how to commercialise industry does. But industry and research don’t necessarily talk. I dunno I think that because a lot of our and I’m not sure about the members of the Marine Cooperative this is part of my concern but certainly Verdant Soni data have strong links with research because the directors have come out of those research institutes. Barking Spider came out of the AAD, Tim Pauley came out of the Physics Department of the University its meteorology, these are special guys. But I don’t know, given the companies that are in the Marine Cooperative what their links are, they have struggled even though II Grants Committee said we need to have stronger commitment from the research institutes, they failed to provide that. It was just Roy’s persistence that got it through.

R. Absolutely, absolutely but what Sona Data are doing is that they are
strategically thinking about who else is in the space that can add something to their R&D who are undertaking R&D that will help them access or provide solutions to market demand. They have the links in the market, they have the insights into what’s needed and what the next steps are, they then look around and say well you Barking Spider you’re doing some interesting work on I think we can incorporate, come in and partner with us. WC Cromin?? Company they’re an engineering firm so how are they involved well obviously they are producing something that Sona Data can see the market wants. That’s much smarter way of going rather than thinking well OK well what OK well what can we as a Cooperative what can we produce that we can find a market for.

R. Oh yes, it was frustrating incredibly I agree entirely. In fact I was quite outspoken because I don’t believe that setting up the group without having a project without having a market opportunity is the wrong way to go. Its like a tail wagging a dog. If there are market opportunities identified and enterprises then the group get together to address that opportunity you don’t set up the Cooperative and put all that effort. But there was no amount, we couldn’t persuade.

R. Well always in the early days when you are trying to develop something and there’s not a necessarily commercial reason if there’s a commercial imperative for two groups to work together the two groups will work together because they can see some money at the end of the line. If you’re at the stage where you are wanting to harness that interest and enthusiasm you need somebody to bring you along and I think without that people need to enjoy going to something in the first instance. If I think about spending time working on something and perhaps it’s a pro Bono thing or its not necessarily part of my core duties then I look at things like what I get out of it personally and enjoyment wise as one of the reasons because I like to engage with people I see well how enjoyable is that for me? And I think if you’re going to get people together you someone to energise, to enthuse someone who has a bit of leadership and respect amongst the community so they think why are they buying into that, I’ll go along to that. Always people want to be part of something that they see has some legs and has some enjoyment and something for them and I think at the end of the day that’s really important.

R. Well I just question what’s the point of the idea? If the idea comes in response to a market need then its not that difficult to take particularly of you’ve got an industry conduit to take that R&D out to that particular market. Trouble is that what was research institutes do is they take cutting edge research in terms of lets look at something so we can add some contribution to the world’s knowledge I suppose and let’s look at something that’s going to answer a research question. I mean that’s what we used to do at Menzies, identify a research questions and then say how can we answer that question. Well that’s good to have new
knowledge coming in and that’s an important role, but I see that as potential public good component of what research institutes do and I think that one of the difficulties is that you do that work leading edge research, get published, so who wants it? Who out there wants that research Whereas industry and the markets are able to say well look you know if there’s a real need out there let’s just say there’s a real need for an aerial form of surveying, something that can tell us about stands of forests and bushfires and closeness to houses and da, da da. The market research is telling us that there’s a demand out there, there’s an industry driver that has the access to those because the industry has players that has access to those markets, who you’ve got the research capabilities to provide some input into that. You see if you look at VEPAC which is Nathan’s equivalent in Victoria they do a lot of work in the bioinformatics space and they are very much looking having their research priorities determined by what industry needs in terms of its R&D. So whilst Nathan’s got good ideas, but what’s the demand from the market angle? I mean these are pretty sort of, I guess they are not off the cuff, I mean I develop the thoughts as I’m going along and I’ve not been in this role very long but its becoming clearer and clearer that perhaps the focus has been too much on let’s commercialise what Universities, research institutes have but researchers are researchers they are not commercial entrepreneurs and we’re expecting too much. So I can see the Cooperative potentially if you had a different set of players could have an important role to play but now we’ve got a consortia of medium size player little ones around and you’ve got these other groups of little ones I know which one will have the commercial success. R. So the Marine ICT cluster spent quite a lot of time on its legal things and so on and that took up a lot of the time and so as to whether I got to work through the ideas with them properly is another matter. But the ideas I did talk about were things like I gave the example of valuing adding to the sea-surface temperature measurements, overlaying this with your position and putting it out on a ship. So that’s an example of an idea that I thought which would have been copying some else’s idea but entirely relevant. Another one was in instrumentation. CSIRO has a thing called ARGOS, argofloats sink and get transported by the ocean currents and come back up. I talked about remanufacturing those argofloats for two particular problems one is seaops around Antarctica and the remanufacturing consists of to some extent to solve the problems it just involves knowing what the temperature that it is either too cold or too hot then you don’t go into the sea ice, you sink back down again and travel on and you wait until its free. So we like to employ aground Antarctica. It’s a big volume of sea ice so the consequence is you’re going to lose instruments unless you put in the right smarts.
And there was another development which involved argo floats. They needed the right density range to be able to go up and down, deep enough and in the tropics the waters are so light they don’t actually come up to the surface. So there was a modification made for that. So there was two ideas for remanufacturing argo floats. Now argo floats is not big business but it has potential. There was also room in the market I thought for a cheap argo float. One that instead of having a capacity of going to 2000 m just went to 500m and I thought there was potential there.

There was also potential in the communication stakes ?? Communications its just a way of communicating. Meridiams are more like a pager you can turn it on and off you can talk to the instrument you know whether its communicated, its not pot luck you don’t have to be listening all the time.

There are some exciting technology developments in autonomous gliders, in autonomous instruments. So these are instruments that fly in the ocean and profile the ocean. They sink they glide down and take measurements and the they get to the bottom of their trajectory and come back up, spew their information out to space sink back down and then they can return or you pick them up at the other end. So there are exciting ideas like this. There are ideas I’m involved in a whale project which has instruments. So there is an instrumentation bent here in this discussion but putting the cordis? On the back of them. There’s an ICT side to handling the data that comes back form them and making that available to the scientists and so on. I have a similar idea for tracking icebergs. What else, there were probably other ideas I had at the time which were to do with technology diffusion. Diffusing out uses, high performance computer net, courses, education also require ICT. I had those sorts of things

Node 4 Tools/knowledge

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Things like setting up patents and copyright for young organisations are new, they’ve never been involved in Acts and legislation and all those sorts of things. So having this across the groups and sharing all that information.

Indeed what happened with the cluster group as we started talking about
the concept of cluster the question came up who can we benchmark ourselves against? Which of the States had groups of clusters then some searching was done on that and we found that NSW had some, Adelaide had done something. So we actually found three or four other cluster groups that were in existence. So there was some benchmarking done on those. But as I understand we came out pretty well at the end of the day against what they were doing. Once we found other clusters existed that we would not have known otherwise, so I’ve got no doubt that some of these members here might have migrated across and made networks there as well.

[Marine_Cluster_AAD : 87 - 89 ]

I. So how did that search for that information take place? Was there was discussion we need to find out and somebody delegated and they went off and did a search?

R. A couple of ways we eventually got the State Development Authority involved – Therese – and Therese, not Therese, Wendy who had helped with a cluster group elsewhere and she offered up that information up and someone else went off and got on the web so it escalated and found a couple of others. They came back with information. Roy spoke to a lot of people and out of that they started to formulate what should be happening. And someone went away and looked at as a group what do we need do to be accountable how do we need to set this up, what’s the documentation, are we corporate, are we a business what are we? Michael I think did most of the work on looking at how the group ought to be formulated, officially, how it could be accountable and protected and what sort of charges, how would you become a member, how much would you levy people to become a member.

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R. Hmm. Well the State Government became involved and in particular this Department, it was kind of serendipity I’d have to say in the sense that I generally after I moved into this position and saw some of the developments around industry in Tasmania I was interested in clusters. So I took myself off to an international cluster conference. Just from a policy point of view I thought clusters was something this State should start to investigate because its seemed to me the make up of SMEs here and we were talking about collaborations and partnerships but no-one had actually gorner that formal step into a cluster and I was really interested in doing it. So I’d taken myself off, hadn’t had any
discussions with anyone and then Wendy Spencer one of my managers came to see me. She was involved in this group at the moment and would I go and hear the group because it seemed like they were at a certain stage of formation but didn’t know where to go next and maybe I could help.

...  

[Marine_Cluster_DED : 17 - 19 ]

I So has there been, as far as government is concerned what is the learning that has come out of that?

R. Well for us I thought it was really good because I think a lot of groups ask government to come in as a rescuer or we spend a lot of our time on committees when I think the time State government people should be spent doing other things and I think and that’s why I was really happy about the marine as a good model because we were asked to come in at exactly the right time. Even though we did have another person who had been in a bit earlier at least she saw the signals clearly that she didn’t know where to go next but she knew that they weren’t going to go any further unless there was some sort of intervention so I think the learning was the groups have to govern themselves they have to have a champion and I think the other learning was we can help with capacity building and what I want to do around clusters as well if we don’t have champions in Tasmania we might have to grow some and I think governments can play a role there about growing some of the champions.

...  

[Marine_Cluster_DED : 96 - 98 ]

R. Yeh On the whole I think the marine science one even though to be honest I would have supported any cluster that looked as though it was at that level of formation. I was glad it was marine science but I just have been involved in a few groups that haven’t gone anywhere where there’s a University course brought some people together recently I went to it, CSIRO, AAD to say OK let’s do the breast of the South France has done it and when you think of breast you think of Antarctic, research and you do and why can’t you say Hobart and think the same thing because we have got all the ingredients but there’s something missing and so in terms of the life sciences decision, in terms of what this audit will show next month and all the rest of it of course its going to show that Australia (???) basic institutions. But also we take that for granted. Do have any guarantee that CSIRO will stay n Hobart I suspect not. We could have this strategy then in 5 years time and things like the airlines I know CSIRO feel really disadvantaged about because now they are moving equipment twice because they fly JetStar to Melbourne and then they have to transfer it and its caused a lot of anxt in their organisation and its all that sort of anxt that adds up and if you have an opportunity may be you do move State.
Which would put a big hole in our strategy but what strategy in the sense that its all this good coincidental stuff that we’ve got leverage from, but leverage is porbabaly the only ???
R. Yeh there was. I think um there is that bit about both of us wanting different outcomes, they wanted an EO, they decided as a group what they wanted, and that was fine. All I said was that’s fine if you want an EO and you want to go a certain way. The State Government doesn’t have to intervene in any of this, so if you want an EO put on an EO, but obviously they wanted us to pay for it, but I wasn’t going to pay for it or the reason I’ve already outlined, it wasn’t an appropriate role and then if we did have a feasibility study which they did want anyway um we wanted something that was more holistic than just supply driven, we wanted to know where the markets were.

I. What was your sense of people on the Committee their knowledge of those types of programs?

R. Low.

I. But if that’s sort of knowledge and skills and attitudes

R. Yeh because out of the commercialisation Ready course I think IP would be the thing that comes up again and again as the biggest barrier and all the legal loopholes through it all so if Michael has worked his way through it all through the maze, that’s fantastic. A lot of it too is two cultures that are so different in terms of business and that scientific culture about just realization about what can be commercialised and y’know and even though I’ve found that point hard to believe myself because you deal with these people and they are just so switched on to their field but they are so switched off to every other field its just unbelievable (look up England institutional arrangements which may overcome some of these gaps/barriers e.g. do people meet regularly and are exposed to each other’s discourses and therefore come to understand something of the possibilities and of each other?). Even in Antarctic CRC and whether we say in three years time we might write an evaluation to say look maybe we should have done it really differently. But I don’t know. Maybe one person’s contribution plugging away and chipping away and you have a big a much bigger assault form the top down or something

R. pause only one thing but it was just I suppose about the EO they used The thing that surprised me the most was the difference view that people had stored in their own head of what the cluster looked like and they were the members of the cluster and everyone sees the world from their own perspective and whether they’re research institutions and I’d see them separately I’d rock up to something else and one of the people would
be there from the cluster and you’d talk to them and it was so peripheral to what they’d been doing and being invited to a meeting sort of thing. Whereas some of those other businesses who saw themselves as the real drivers thought it was really central and it was really exciting and then I ’d talk to some of the others and they’d say this word cluster but they wouldn’t have clue what they were talking about what a cluster is. So I suppose how you just how you entered it and just the different knowledge base about what a cluster is and how it works it sounds like right from the start and I gave Roy a lot of that info. After I went to that conference and I just said burin it if you like but at least there were lots of papers about in principle how a cluster grows and these were the ten success factors you need (need to get hold of these) to have a cluster and unless you can tick these boxes don’t move to page 2 sort of stuff. You know that sort of thing. But I think he did use a lot of that because earlier on they probably should have someone come in and talk to them about how a cluster what its about because few of them operated on the view that everyone had the same level of knowledge that they had.

I. So the role of II how did you see that?

R. Oh it was mixed I think II had its own problems which I think made it difficult for it to operate effectively

I So, what would have been effective?

R. Um it’s a mute question. Not necessarily on this project but on a lot of projects, the big it takes time to work things up in government, well take the project we’ve got now, if it takes ‘till June/July to write a contract, nearly 9 months to write a contract for 3 months work that’s a but unbalanced. The problem with government is that they don’t see those first 9 months almost, they only see the 3 months because that’s what their objective is. The difficulty is that you always have working with government is that time is not critical whereas in the commercial world time is critical and there’s been a number of projects, not just II a lot of government has come into the State and elsewhere, not just Tasmania, where opportunities have been squandered because its taken too long to actually do something. Someone’s got half a million dollars to spend on system x and they say we’ll be the first State in Australia to have system x. Great. Its creates opportunity, maybe we can do something with this, does it scale up to NSW, maybe not but we can one in SA, maybe WA and QLD. There’s probably only 3 sales, almost 4 sales almost guaranteed and 5 or 6 if you are really lucky. OK a real opportunity, half a million dollars worth of systems development for the government. They get a
product out of it, they get something for their money, but what they are doing is they are helping you to define your IP that’s in that product and to get the bugs out of it, in the literal sense as well as in the design sense. So at the end of that project you walk out of Tasmania with something in your had that says its does this, it doesn’t do that, it works come and have a look at it, I’ve got a reference site, these people are very happy with it. Its how Human Solutions started working in this State, got a job with ??
I don’t think government sees that enough. I think some people do but I don’t think government as a whole sees that. What they see is half a million dollars worth of public funds that they have to do due diligence and probity and the paperwork and the contracts and, and, and. And that just drags the whole thing out. So yesterday it was an opportunity two years ago it was a possibility, 12 months ago somebody else has done it, we haven’t finished.

I. So the IP arrangements, ?

R. People value IP far too highly If we do a job for a government agency and we saw a commercial opportunity we would negotiate a ??solutions grant?? So we own the IP

I. So its just a matter of understanding the process?

R. yes and I think and I think to understand well what’s that IP worth? Half a million dollars they spent 3 years ago on a system that 12 months later I’m able to sell to another State is worth half a million dollars, its value is only worth what it would cost to build it. So I might even be able to get half a million dollars for it because I’m trying to stop someone else building it from scratch or I might even be able to get $250,000 for it, it already exists so that’s pretty good. ?? system its doing the job, it already works its doing the job it was designed to do, how much do I need to get back of that half a million dollars? In theory nothing because they’ve got what they paid for, in proactive they do have some rights, that’s what IP is, rights, but those rights might only amount to $50,000 in $250,000 because I’ve had to adapt it to use in other sites which is not always easy plus I to go and sell it, plus I carried the commercial risk in professional indemnity etc, my reputation and all these things and they get $50,000 that they put back into consolidated revenue. Its being able to negotiate an outcome like that I wouldn’t go into a project like that without some access to the IP.

I. What sort of knowledge about that sort of stuff is within the Cluster, I mean its within you is it??

R. I would say probably half the cluster is pretty good and the other half is still struggling with this idea that things have value because its exists. The value of that tape recorder is inherent because it exists its has no value if it doesn’t have a power cord, it has no value if it doesn’t have a tape and its doesn’t have a microphone. So when you lose
the microphone or you have left it at home or someone pinches it and uses it on another piece of equipment, what is its value?

I. So if that’s fundamentally the core of what’s meant by commercialisation? Its about its application and its use in the context?

R. Oh there were ideas there and then I did a lot of research particularly on the forgotten what they call them now, … new Generation Cooperatives in America. And the fact that these Cooperative were being formed in different sectors and not like, they are not like the Housing Cooperative people get together to form Houses, they are not like Dairy Cooperatives, but they were, in some places they were short lived Cooperatives. They were industry focussed, they would allow not just individuals as members as the old generation cooperatives. Its going way beyond Porter’s exposition of industry clusters. Some of the different States some in the South and some in the North I can’t really remember which ones they were, but then we looked at what we can do under the Australian legislation and then I looked first of all at the Queensland and NSW areas, particularly Queensland because they were very keen that trading cooperatives were permitted and then I started looking at Tasmanian law which had been an Act since 1923 to allow cooperatives including in that the Trading Cooperative. So there were already provisions there in 1989 they made it even more relevant. The Cooperative trading laws in Tasmania would allow the sort of cooperatives we had.

Q. So the idea of the Cooperative came form the American model?

R. Initially that’s right that was the stimulus really when you start looking at those laws that they exist in Australia then it was wide open for us.

Q. So the opportunity was there

R. And it looked to be appropriate and we discussed matter with members and what was most appropriate and I went away and wrote a position paper and we started from there.

Q. So some of that I imagine was rather different from clusters for example in Europe?

R. They don’t do it that way
Q. Different legal

R. Different legal structures and the Cooperative well cooperatives I guess have always existed in Europe but the American model and the Australian model is slightly different and its more practical.

Q. So is the health infomatics cluster and the software cluster are they similar structures or not?

R. No they’re not. They are quite different. The health infomatics as far as I know is waiting on decision to made by the University and weather they will be part of it or not (???) as far as I know.

Q so they are much further behind?

R. To a certain extent, $20,000,000 it’s a different scale. You would expect it to be different. And government departments and universities we hope/had??? to avoid?? The elearning cluster I think they are now coming to the realisation there are so many people in and I would class a lot of the people as tyre kickers. They may be better off just sticking with a loose association. Maybe an incorporated body but an association.

[Marine_Cluster_TasIT : 149 - 162 ]

R. Yes it is. Part of the thing is that the IP issue is something that you’ve got to resolve pretty early in a project. We found that it was most unlikely that we’d get a general IP agreement to work with an organisation that we’d have to present it for or had to renegotiate every project.

Q. Right, OK in relation to those three organisations?

R. yes It may in fact turn out that once we’ve done two or three and we’ve got the guidelines set properly that it may come to one but at present they are probably treating us with a bit of arms length.

Q. So it’s a case of establishing trust through actually doing something?

R. yes, and I think once you do that it will be right. There were unexpected dropouts in terms of the industry and we thought some were likely to come in in terms of the membership. In terms of the government and KPMG, they were unexpected in our initial discussions of what they would come up with, we expected it to be a much more useful document and to guide us a lot more, and that didn’t happen.

Q. How much control did you have over what they were doing or was the arrangement with DED?

R. With DED, so we didn’t have very much control. The fact that they
didn’t talk to us until after it was done basically and the other thing that was unexpected I suppose was that they tried to do it in a format and ??? that really didn’t work. I could have done a damn sight better job myself. They weren’t as good and on the ball as we really had expected. I guess the thing that was fairly constant is Rob Valentine’s support [Rob Valentine is IT in Health and Community Services] was good all the way through.

Roy’s idea was basically we should be able to exploit this. Interestingly he didn’t chase the bioinformatics money at the time. He was working with the things that exist. I thought that was a very interesting idea. I’d been hearing about clusters through the APAC technology diffusion activities. Understanding how some things can float if you have the chain correct you can follow things right through by cascading things. So ideas, techniques, better production, shorter turn around times and so on.

I was keen, for a variety of reasons. I could see that Hobart had all the right features so if you can translate that into money or activities for ICT I thought we’re going to make some significant wins. That’s one win, the second win the TPAC could become a conduit for the technology diffusion activities. It turns out the technology diffusion activities are off the agenda now and so I don’t have to work hard at that type of thing. But I still remain keen on the ICT side because I can see there is a lot of synergy.

...
pushed on, so SONI DATA is a classic example of that. A company more or less born out of the AAD interests in counting fish, counting krill and acoustic instruments were made and software was developed making it possible to interpret they actually purchased acoustic instruments. So they learnt how to create the software and interpretative tools. And that became Soni Data.

I. So that was a commercialization?

R. Yeh, very successful commercialization form the Division. I guess Soni Data is 15-20 people now. And Barking Spider is another company that commercialised at a very low level, automatic weather stations developing automatic weather stations for Antarctica and have special characteristics, hardy to the extreme cold. They are really to achieve their own goals and not actions to take back and add value to it. They are the classic example that CSIRO produced AVHR pictures of sea surface temperature form outer space and they put that product on the web and fisherman pick it up and figure out where to hunt tuna and so on. And another company came along took the same sea surface temperature and combined it with GPS so you knew where you were on the figure and made it so you could have it out on the boat, they didn’t have to work at it, they developed product from that and sidestepped CSIRO altogether basically. So in some sense that’s a good outcome, it’s a commercial outcome but it could easily have been value added from what they were already doing. So there was an opportunity lost at some level by CSIRO or wherever you get recognition.

... [Marine_Cluster_Uni : 70 - 80 ]

R. There was a little bit of frustration for me. But I also understand how long it takes to write proposals I also understand how long it takes to build relationships up I also understand it takes to become active. They run the risk of it being too slow but on the other hand Roy has been very persistent and very meticulous I think in setting up the trading organisation. I was relatively keen for the University to become a member of the cluster but I think I will run into troubles with the trading aspects of the cluster. The University is not a trading organisation, so they are more likely to be a client.

I. So IP is often spoken about as being a barrier to institutions taking part?

R. Oh it adds another layer of frustration to the thing. I don’t think IP is a barrier at all really. The problem is that there are so many people that are confused about what exactly is IP and what ?? and how we should protect it or not how you should get international recognition form it. There’s a kind of confidentiality and secrecy that goes with it that while its important to commercial interests it just adds layer to how you work.
I. So that’s the difference that the University is not a trading organisation?

R. The University has an IP aspect to it too, don’t you worry and want to hang onto it, but from a research office. But the point is much IP has no commercial value and therefore it has zero value and of course its completely useless until you commercialise it and so we should be getting notoriety as much as we can as well because the way the research funds have come from the University is related to our successes so our successes can sell for a $1 but they make a few million dollar organisation or a $10 million organisation then we’ll get more money for sure because they’ll understand that we’re doing something.

... [Marine_Cluster_Uni : 103 - 105 ]
I. OK right this question about different sets of knowledge, how did you see the different skills sets of different organisations, what was your take on the way they ???

R. It was very interesting, it was quite variable. There was a workshop that they held, there was a very good response to that workshop, a lot of people were interested and I gave a talk there, do you have who gave talks? There’s a document around. So there was the inside GIS guy, me a bit of Roy and then there was basically an open discussion and there were people from the AAD and CSIRO and so on. And then there were a lot of companies, there were quite a few marine companies around in Hobart there might have been someone form National Oceans Office and there was a very good agreement about having such a thing.

... Press Page Down to see later text.
APPENDIX 10: EXAMPLES OF MEMOS

Examples of Two Memos

NODE (9 4) Interaction

Interaction requires a mutual (?)shared) interest, something seen as a possible opportunity, in this instance a shared business interest over a potential product.

"R. My association with the Marine Cluster developed with my association with Roy Pallett who actually visited the AAD where I was working and he became fairly interested in the work we were doing there in multi-media. We were pretty much cutting edge in that period in the context of what the industry outside the Division were doing. So Roy became fairly interested in that wondering how his business might provide a service for what we do or value-add what we were doing. We talked a lot about that, talked a lot about commercialization"

"So Roy was interested from that concept purely from a business aspect because he had his own business. We thought that perhaps we could profile it somehow through his business. It might become a marketing arm for us, many other people would like to. It was reaching a point of putting it on the market place, taking this archive and putting it on the market. But before we got there was had to get the agreement of Commonwealth government."

"I was never going to become a member, and neither was Patrick because and a few others we weren’t going to put up money because we had no businesses we were going to get a return on so we were really just support people in that context."

Roles of subjects in the collaborative process. Not all have to have a mutual/shared object, but an overlapping object operating with slightly different motives, or longer term and socially oriented motive for interacting and participating.

In the following example, the shared /mutual interest between the champion (who worked as an IT specialist as well as holding an influential position) and the subjects involved with the Cluster group form TasIT was in taking up an idea which could develop the local industry.

"R. Basically, it might have been 2002 I was just considering different IT activities happening across the State thinking to myself that there might be further opportunities for Hobart to have something here or in the region to have something happen. So I rang the president of TasIT at the time and said look what’s going on what are the different projects that are on the go and is there anything that I can help in help to promote or otherwise? They said they’d come and talk and so they came Roy and Dick came and spoke with me basically they said there was this particular project, the Marine Science cluster that it was Southern Oceans, it started out being Southern Oceans research but nevertheless it was all IT related they had this vision that rather than See the IP of CSIRO and the University basically being sold offshore to companies on the mainland, if you like, or the opportunity for that to happen in developing product for their research purposes perhaps there was opportunity for Tasmanian companies to come together, to basically provide what the mainland
companies were providing, only in a collaborative way. So we agreed that we would, there may have been some more intricate components in there, but we agreed that it would be worthwhile bringing various players and industry together to discuss this concept of what ended up being a Marine Science Cluster."

DED, the motive for DED interaction was that the cluster presented an ideal opportunity to test some theories about cluster development and the role of government in the State.

"And when I went there it was like I was handed something on a platter because I’d been sitting here in isolation thinking to myself I really want to pilot something in clusters and where State governments fit in. And I’d put something a paper together that I’d been talking to the CEO about I don’t know what State government’s role should be but I wanted to be able to test the waters and see. And went to the first meeting it was just like a text book in that they’d formed up to a certain development and they seemed to have the right players around the table but they were just going around in a circle because they didn’t know what to do next. So it was really good timing I think for the State government to get involved because they had actually formed themselves and so it was organically done, it wasn’t anything that government intervened and said we should create this and I’m not saying government’s shouldn’t but the model I was trying to test was exactly the one – when I was asked to go to the meeting it was the right time for us to say we I just said I’d like to test he cluster principles and they just said so did they so we actually commissioned a study and they did need an input of funds at that stage and that was something that I could actually offer."

"Mine was to TEST whether we could build a cluster, so mine was to test because I still think they would have stayed together because they’d formed enough as a group but whether it would be a cluster or not I had grave doubts because they didn’t know clustering and what they’d do with it, but I thought they’d have collaborative partnerships after that and I think our just gave them that extra ability to make a decision, Now the decision may have been, depending on the report but that would have still been a valid decision so I thought our input was to assist the cluster to see if its worth going forward."

Firm 1
First involvement of firm 1 was initially through an email from TasIT. The motive for pursuing possible involvement was that this subject perceived that the cluster had credibility, given the people who were involved. Involvement with other ‘clusters’ which were associations meant that this subject well understood the business benefits of being part of a cluster group. " There was an email that said it was going to happen and it was just the wrong time for me I was at a stage we in a busy period and a number of projects. I thought oh yeh that’s good I’m interested in that, oh bugger it I can’t go ... I couldn’t go to the initial meeting, 30-40 people turned up, I couldn’t get there I just wasn’t available. I don’t usually delegate this sort of stud because it can be a time waster, its better to waste my time than the person I’m paying. Then a little bit later I know Rob and I know Roy and a couple of the people that were involved I knew through industry contacts. I thought its got a bit of credibility and its got momentum let’s see where its at. I went along to a couple of meetings and got involved in doing some of the paperwork for it."

Enhancers to interaction taking place
* credible people involved as individuals, roles and representative of relevant activity systems
* persistence of a persuader to bring others along (see II)
* persistence with accessing resources "it was Roy's persistence that got it [the funding application] through"

Barriers to interaction taking place:
* for businesses it is time out that cannot be charged out

Enhancer to moving from interaction to participation is an appreciation of any different discourses, an ability to engage with these or at least step into another's shoes.
The degree to which II did this was minimal. Did not examine their own assumptions about Cluster development ie did not perspective make (Boland and Tenaski 1995). Did go through the process of developing more coherent meaning structures when presented information about clusters to the group. However congruence was not achieved - Wendy's statement that there's a different agenda here. So making visible (Engestrom) assumptions does not necessarily achieve mutual understanding/congruence. Without examining your own assumptions it is more difficult to step into the other's shoes - to perspective take (Boland & Tenaski 1995).

Although participation does not proceed as a result of interaction, there are still potential possibilities from the relationships that develop through the interaction process.
For participation to take place, there needs to be some mutual benefit, not just overlapping of interests of the object. So for example, those involved from the institutions, who perceived that their rules did not easily permit participation within the structures being establishing by the Cluster group and who were present and interacting because they saw possible avenues through a marine ICT Cluster for commercialisation of some of their activities, as was the case with the subject from AAD and the University, there was an overlapping object, but not an object that produces mutual benefit once the focus moved clearly to developing a structure for the Cluster. This lack of shared object did not permit commitment. Future possibilities for collaborative production of an object that produces mutual benefit, however, are outcomes of interaction.

"R. They [subjects from the institutions] have contributed ideas to the whole thing and they've been going to meetings and helping out wherever they could. We still maintain contact with them. We've invited them to the launch and the relationship is such is that it won't be near anything as hard as it would have been 18 months ago to develop a working relationship."

overlapping but not object that produces mutual benefit (Uni/Cluster group)

"R. That's right they are scientists. That's the point about the ICT business it creates, the truth is we're not that interested in and can't push it [ICT business] out but a marine ICT cluster might well be in a
position to push it out because it’s in their commercial interest and they can develop the relationship with the various organisations. So that was how I saw it. They were to do the diffusion if you like, and the uptake and the marketing itself and make the money out it, that’s fine. We’re happy if they make money. So that’s the sort of relationship we thought the cluster would create and encourage."

shared interest/focus was that participants recognised the possibilities of a marine ICT cluster

Interaction involves:
* working towards developing a more coherent meaning structure which may or may not result in shared/mutual understanding
* as the meaning structures emerge, subjects form each participating activity system examine the match, the degree of overlap or possibility of shared object, what their activity system's rules will and will not allow, and the division of labour may require that the subject takes a proposal back to the all the appropriate decision makers in their activity system. This requires the subject convince the decision makers of the value/worth, the potential for use value and exchange value from continuing to participate.

Tools used in interaction: A detailed understanding of the tools used in interaction requires an ethnographic methodology. However, it is possible from this study to identify some of the tools at a more macro level.
* use of / application of policy this opens up boundary spaces
* seeing opportunities
* dialogue - look at firm 1 comments on how the key questions could have been made clearer earlier, the need of a facilitator to bring these questions forward
* facilitation skills

Division of labour in this instance was ? direction steered by the originators?? check, need minutes.

Subject/initiator(s) require passion, commitment and perseverance

**NODE (9 3) Perceptions of others**

perceptions/judgements of others is bound up with expectations of those activity systems and what the subject perceives they can and should deliver.

AAD: "It created a good groundswell. I was disappointed that State Government didn’t do more in the context that here was potential employment here was potential development of the industry, education, and all of those rolled in meant potential for profiling Tasmania for this industry. More so marketing, more cutting edge stuff out of Tasmania. There’s a whole lot
of stuff sitting in there I would have believed given the right support and I think this is what it comes back to money and push by the Government and I believe it could have been a lot better if it had happened a lot quicker. Although State Development did what they could within their charter they were bound … Maybe if we’d had more high level government it may have been better.”

"R. You don’t have proactive government. The closest person that got proactive was dynamic little guy [name of public servant], great driver. If anyone could take it anywhere within the government it would be David. If they link up to him now it could take it even further."

"R. [DED] are hampered, their hands were tied they could only do so much, in terms of tying the money. Probably limited by their accountability. I think they’d been given this is all we can expect you can participate on certain amount of money, time. … They did all they could possibly do within their umbrella, they did put a lot of energy in you’ve got to give them full marks for that. It was more probably who sits above them."

"R. Its really the role of government to develop industry employment and education, if the industry isn’t crying loud enough for the skills it needs, the education department ain’t going to do are they?"

Yet DED subject reported that the Cluster presented a great opportunity and for her "I was more excited" about the Cluster group and their 'organic development. i.e. it surfaced without any government prompting/assistance.

DED" “R. Roy probably thinks I slowed down their process at the beginning because they were just so head on to we have our own method and no other method will be entered into, at first and then of course they came around. I was happy about it because as I said it was a real live example that had been organically grown and I thought that was really good.”

"R. Not necessarily with me because they plug into the agency at different levels and Michael and Roy have both had a pretty big involvement with DED over the years and its different iterations or whatever, so those two would be pretty ofay and they just plug into the program level that they want. Roy just keeps me informed about I suppose the health of the cluster more than anything because that doesn’t fit any program area necessarily, but direct intervention I haven’t had any and I’ve really felt very strongly about that from the start that was one of the strengths about the cluster I really liked. Even though I thought because they were isolated and when I first arrived they had been talking to each other a bit too much that’s what I mean they had that very firm idea about this is what we’re going to do rrrrr that’s the last model I’d go for so I’d probably be about one or two meetings too late because they’d worked it out pretty quickly I think they’d formed pretty quickly up to a certain stage and then they probably needed a bit more external intervention then because they would have just chased their tails I think.”

Uni: “Now that meeting occurred it must have been about 6-7 months of initial meetings and then there was some frustration, it took Roy some time to get some money out of DED to get an administrative officer to do a lot of the work as comes with setting up things like this. So I think Roy and Michael Rochford have pushed it along quite well. I think other people who were around the table they were keen to create more business. A lot of them I think would have seen this as a chance to get in on those marine organisations, they obviously thought about the difficulty
getting in contact with those organisations and getting work from them. So a lot of them were thinking about that. I’m not sure that they were fully thinking about export, the export side. So some were looking towards developing relationships with research institutions, so the commercialization side that I always talked about, I’m not sure of their intent now that’s not true of some groups. Then there were the academics around the table like myself, Pat Quilty and so on. Some areas had nothing to provide. Because I think Roy focused on getting the organisation up and going and the internal parts working which was a very important part of making a guild of you like or a Cooperative that took up a lot of time and I wasn’t interested in that so much so dropped off and I think the people form Soni Data dropped off because of the same things … and so some of our attendances probably became a bit patchy or altering because the chosen focus to some extent and because of the process of getting the internal rules going. ... But I think perhaps if they had driven it through more quickly then they might have captured a bigger kind of audience and a bigger grouping of companies.

Uni: DED ‘made a whole lot of hurdles to jump” - writing to DED to get the money to do the marketing and KPMG stuff, kept hold of the money to run the workshop DED ‘guarded it’.

"It would have been better it they as a cluster had the money to pay the lawyers to do the rules, have the money to do the marketing ... I felt that was kind of a hindrance to the development of the Cluster ... so one of the problems I guess that DED may not have trusted them enough”.

AAD: "R. I don’t think Commonwealth came on board at all, mind you I don’t think there was a lot of work done on the Commonwealth and I think that’s another problem of the size, the availability of people to do stuff. That was probably one of the biggest frustrations, getting enough time so they could get to bigger organisations to really work on. Who had time to spend with the Directors of the AAD, the principles of the University, the CSIRO, to go to Canberra to lobby? No-one. You’ve got to go home and feed the family." "R. You’ve got to be in the system to know the system. This industry probably isn’t a strong enough lobby group."

This was why they Cluster group wanted an EO. I had funded a position for the software cluster, from a different program, to provide it with the skills and time and resources to pull groups together, develop skills and identify needs (check this - see notes from meeting with Marissa) Ran forums to identify barriers and concerns such as IP and levels of professional indemnity insurance. Successfully negotiated a more tenable level of insurance, developed platforms for information generation, dissemination, and had plans at time of interview for product, market, services and sales development. part of the objective was the Process of developing the vision and skills and networks of companies that were involved to be export oriented. manager also paved the way to penetrate what had been perceived by these small Tasmanian companies as an impenetrable DoE, there was no history of engagement. There was a perception that the Department was impenetrable and there was no history of engagement, therefore no previous development of trust, shared language and shared past experience. This is now beginning to be established partly as a result of recognition by the DoE that it does not have to own IP, rather it can have a permanent licence to the product. Firms reportedly recognise they need to know more about the learning process, another indication of participation. DoE, as with all other
government departments own intellectual property
of any product commissioned for them. This was identified as a stumbling
block for collaboration with government. There is now an agreement
between the department and the participating firms where the has a
permanent licence to the product. This agreement was the first concern
listened to and successfully addressed, establishing the basis for
development of trust.
Indemnity requirements by the Department required that firms, even those
of 1-2 people - be for a cover of $10m at a cost to the firm of $30,000,
often more than the contract.
The DoE has access to licensed reports, useful information for the
industry, but these are for public not private use. Ways are being
explored in which this information may be accessible to the participating
players, although it may be at a cost.
Manager pulled together key government agencies – DSD, Premier and
Cabinet, DoE, University, TAFE, Library, Tasmanian Electronics Commerce
Centre and others who are of interest to the industry and have an
interest in the industry to discuss what they can do as an informal
network collectively to bring returns to individual business growth.

Through a joint focus on a common problem, then this ‘unit’ can set up
ways to market the product for the firms, nationally and internationally,
tapping into the DoE networks. This would be done through the development
of partnerships. Product development cycle
Conceived designed developed tested verified purchased installed
evaluated feedback and repeat cycle.

Different sets of expertise need to be called on at different places in
the cycle of development. Tasmanian firms tend not to have access to this
range of expertise. Historically firms look for expertise to other firms
they know, government departments look internally or to other government
agencies or known consultants. Manager is developing a register across
the whole Department of expertise at all levels, so appropriate expertise
can be called on. This is because she believes that ‘our people are the
bearers of our intellectual capital’ and that by relying on individual
experts risk is increased and it is only the individual who stands to
develop, not the firm, department of industry.

Manager has a pro-forma for outlining the rules of engagement for
partnering – ‘so many consortia fall apart because of bad partnership
management’. Perceptions of what the industry needs to learn to develop
to think and know what’s going on world wide
be more prepared to compete through collaboration
to identify and focus on what their own market advantage is and
concentrate on this
identify partners around them and draw on them when they need other kinds
of expertise

Perceived role for DSD in training in effective partnerships
Industry ‘is at each other’s throats’ because they are looking locally, they must focus out, there is not enough work in Tasmania. Small companies say we can’t do it, but they won’t collaborate in order to do it.

Check international lit. for examples of government support - which is in the billions.

AAD: "The meetings were not facilitated well. We may not have been aware of what was happening and I don’t think we were. I mean I noticed people coming and going but I never had time to stop and think why is this happening? Had we realized we might have been able to restructure the meetings that facilitated everybody and retain that interest. I think people would come in and listen to the garble (I. It would be to them) R. and bugger off and the cluster may well have lost so many people because of being unaware of what was happening.

Suggests need for a facilitator who is aware of what is occurring and can reflect back to the participants what is happening.

"R. The thing that surprised me the most was the different view that people had stored in their own head of what the cluster looked like and they were the members of the cluster and everyone sees the world from their own perspective. Whether they’re research institutions and I’d see them separately I’d rock up to something else and one of the people would be there from the cluster and you’d talk to them and it was so peripheral to what they’d been doing and being invited to a meeting sort of thing. Whereas some of those other businesses who saw themselves as the real drivers thought it was really central and it was really exciting and then I’d talk to some of the others and they’d say this word cluster but they wouldn’t have a clue what they were talking about what a cluster is. So I suppose how you entered it and just the different knowledge base about what a cluster is and how it works it sounds like right from the start and I gave Roy a lot of that information about clusters, after I went to that conference.

I just said burn it if you like but at least there were lots of papers about in principle how a cluster grows and these were the ten success factors you need (need to get hold of these) to have a cluster and unless you can tick these boxes don’t move to page 2 sort of stuff. But I think he did use a lot of that because earlier on they probably should have someone come in and talk to them about how a cluster what its about because few of them operated on the view that everyone had the same level of knowledge that they had.”

Thuis suggests there was limited sharing of what a cluster is, or what the core group had in mind in the early stages about cluster development and the nature of a cluster.

If "R. I think their idea of a cluster was this is a group of small companies that collectively can provide a suite of products and services to the research community and that if the research community wanted to access markets then they could do it through the cluster. That won’t work because the cluster doesn’t have access to markets. You look at the sales of these companies I bet you wouldn’t find too many of them have got to the international stage. Also the Cooperative could put in tenders for larger projects that the research institutes might tender out. Now that can help grow but its not going to have the ?? growth that you might think .???”
firm 1: "R. Um I think its always things take longer than you want it to, but I don’t think anything takes the amount of time you wish it would. Sometimes you’re ahead of the crowd and sometimes you’re not, sometimes you’re a couple of weeks ahead of everyone else and other times you’re struggling and thinking what the hell are they talking about? And then 2 weeks later oh that’s what they were talking about. So I think the communication that could be lubricated to accelerate this sort of process to make sure that there was much more understanding and I don’t think that’s necessarily an easy again its back to it’s a very highly valued skill to actually be able to explain something to someone, but to explain to to a group is even harder. And they are the sort of external skills that you don’t always have as a group like this forms.”

II talks about how various players changed and also how "I couldn't quite work out what [name] was doing there". A perception that some of the active players were not in the marine ICT space and also the small companies that did end up being part of the Cluster when it was launched not being ‘key players in the State.” All this suggests facilitation needs. Wendy also speaks of her perception that due to the difficulty of keeping up the enthusiasm and ideas and this was an impetus to focus on something concrete ie the structure of the Cluster. She suggests there was limited ‘clarity of issues and the vision was ot external. The vision was never, what is it that is needed by the market."

II ‘there was no charismatic vision from the person who was really driving it’ ability to get the direction going and the discussion and ideas happening was lost ‘because they didn't have the right sort of facilitatoty role as chair’. The practicalities of working energy was also problematic. "huge energy levels" in the forum and lots of people, the audit came out of that, but by the time it all happens, ‘the enthusiasm has waned’. Another reason for the Group to have access to resources so they control timeframes. perhaps needed a reference group with government on it.

Did not 'canvass" (AAD) what impact the software cluster might have. Was there an environmental scan? Check KPMG report.

AAD: "R. Umm I think it might have taken a bit longer, because we did provide a lot of knowledge for Roy. ??? I think that’s probably the strongest support we provided, keep going there’s potential there and Patrick would put in from another angle and they guy from Uni came from another angle too. I think for Roy it was there is potential there.”

Impetus, passion and commitment are further enabled by the support and encouragement of others. Participation/interaction but subjects has an additional purpose?therefore does this stay at participation because there is no mutual fous of the object, but there is an overlap, or is this something else. Perhaps participation has multiple roles? Afterall some of these people were involved for some time and at least one (AAD) was involved most of the way through the development of the Cluster.

"R. Well I think there were [adequate skills within the group]. There are some key people that were involved
at if it hadn’t been for them. Michael Rochford Human Solutions involved and I think its fair to say it took off quite a deal when he became involved, because he was very can do. I’m not quite sure what his company runs but he as an individual was keen would sit down and do the papers, put some energy into it in his own time he wasn’t getting paid for it and he wasn’t a principle if you like in TasIT. I mean it was an individual company that was willing to put in some hard yakka and that made a lot of difference. I’m not saying it wouldn’t have happened without him I’m just saying that his enthusiasm and his ability to be able to read a set of circumstances and see an opportunity is I think and people feel each other’s commitment from each other, they feed off each other and it’s the reason why clusters can work.”

Recognition of each other’s strengths/attributes.

Interesting that many in the group did not know what each other’s company’s were. Further evidence of a need for good facilitation skills form someone with a knowledge of cluster development and without an agenda.

Those in the group and the group itself needed to find their boundaries and work out their roles and understand the potential roles, limitations, rules and potential of each activity system involved.

DED: “R. even if we did the supply side about what could each organisation offer because they needed to do an audit of the organisations. It was, one of the decisions they needed to make I thought and I was really clear that we weren’t a decision making body in the cluster and that we should only intervene when it was appropriate. So at first I think they thought we had become part of that group and belonged to that group but I was really clear that we should never if they don’t own it and run the cluster… which was really frustrating for them in the sense that you’ve got people that have got other businesses who are trying to come to terms of how you actually keep this together what’s the legal entity, what’s the relationships entity, who’s going to do the actual arms and legs on the ground and I think what they wanted us to do was fund a like an Executive Officer for a year and I was really against that.”

Cracking the institutional barrier:

DED: "R. Its [the gap between small firms and the research institutions] huge because that’s also it seems to me, not the idea of the issues but the idea of the gap is there also between commercial firms and government.

I. different discourses, very different discourses.

R. That’s true, yeh different worlds

I. Different sets of knowledge

R. Yeh and we bump up against each other we don’t actually interact very well. You look at the firms in Tasmanian that have been successful out of those institutions, they are all spin-offs, so you know the territory, you know the language, you know the y’know

I. And you take the links with you

R. That’s right. You just look at all the barriers, There’s all those big institutional ones that governments and those big research institutions have because they’re just how you get in and where you get in its like
trying to y’know work out the feel of an elephant in the dark or whatever that saying is and the language and the rules and the lack of them. With the institutions I think the IP thing is just huge. That is such a barrier in Australia generally its like um governments don’t want to see Australia leading the world with some of our Technology, about the rules around some of our IP and its Government owned IP that’s the thing I find really difficult.”

"R. A lot of it too is two cultures that are so different in terms of business and that scientific culture about just realization about what can be commercialised and even though I’ve found that point hard to believe myself because you deal with these people and they are just so switched on to their field but they are so switched off to every other field its just unbelievable."

"R. that scientific gulf that is so massive it is incredible, its just like two totally different mind sets ...There were about three things I was taken on a tour around there two years ago and I remember I could see three things that I thought we could use commercially. The guy who works on the monster squid that are found in the Southern Oceans he uses this sort of sonar thing that he has developed to find them and it responds and be only wants to find the squid, so it responds to temperature and the characteristics of the squid and I’m thinking why couldn’t that be the fishing fleet looking for different sorts of fish? Like I wouldn’t have thought it would be that hard to change that. What he’s about is scientific research, so he’s not about the equipment even though he developed it, he’s about the squid."

Champion important - someone with profile who could invite others along from the institutions and the invitees would look more positively on the invite than if it came from someone unknown to them.

Verdant dropped out - they are involved in the marine agricultural area and "they are much more commercial characters" (firm 1).

Uni: Sense of identity with the industry - motive: social good, organisational and personal

“I was keen, for a variety of reasons. I could see that Hobart had all the right features so if you can translate that into money or activities for ICT I thought we’re going to make some significant wins. That’s one win, the second win the TPAC could become a conduit for the technology diffusion activities. It turns out the technology diffusion activities are off the agenda now and so I don’t have to work hard at that type of thing. But I still remain keen on the ICT side because I can see there is a lot of synergy. ... If you go to some of the key oceanographic cities San Diego where they a research institution of oceanography you’ll find there are businesses that are built around the research organisation there and they provide world class instrumentation and new instruments, some very sympathetic instrumentation have come out of ??? and if you go to the Woodshole?? Oceanographic Institution on the Eastside of America have a big research community and they also have development companies built off the research ideas that come out of the Woodshole community. They are not big companies but they are companies and they do seem to be viable and they sell around the world. Marine instrumentation is very expensive, the market is not huge. Similarly there are aspects in France, the UK that do similar kinds of things. So what I, I don’t know if Roy understood, what I could see happening was that with the right sort of things going on within CSIRO, the instrumentation, not so strong on the ICT but instrumentation certainly new things can come out. So the seemed like a good way to go.”