

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview of previous research on knowledge sharing and intranets. It introduces the framework for the case study that comprises the main focus of the research described in this thesis.

It is important to set the context of the literature review work by first providing:

- an explanation of its specific purpose for this particular case study;
- comments on the previous treatment of the broad topic of knowledge sharing, and the role of intranets in such activity;
- an indication of scope of the work presented in this chapter.

The main purpose of the literature review work was to survey previous studies on knowledge sharing and intranets. This was in order to scope out the key data collection requirements for the primary research to be conducted, and it formed part of the emergent research design process (Denscombe, 1998, p. 217). The approach adopted was in line with current practice in grounded research work. It is now regarded as acceptable for researchers to familiarise themselves with existing research prior to collecting their own data (Easterby-Smith, Thorpe, & Lowe, 2002, pp. 46-47), even though this contradicts the advice of grounded theory as originally presented (Glaser & Strauss, 1967, p. 215). (This is discussed further in Chapter 3.)

An appreciation of previous work in this area served three further purposes. First, through providing direction in the construction of data collection tools, it guarded against the risk of overload at the primary data collection stages of the project. Second, working the findings from extant literature into a formal review helped maintain throughout the study a sense of the topic's perspective. Finally, this activity raised the opportunities for articulating a critical analysis of the actual "meaning" of the data collected when the data analysis stages of the research were reached.

A range of secondary data sources served as the key bibliographic tools for identifying relevant work for review. The most significant of these were the Web of Science databases. Personal recommendation and citation pearling also led to a significant proportion of the publications selected for analysis. Relevant publications were found in the literature of a number of academic domains including artificial intelligence, business studies, information science, information systems, organisation science, psychology, science and technology, sociology and strategic management. Most of these publications take the form of research papers. In 2002 a research monograph dedicated to knowledge sharing as analysed from an organisational learning perspective was published (Huysman & De Wit, 2002). Frequent reference is made to the book in this chapter. The systematic literature searching led to key publications on knowledge sharing, intranets and ICTs *in general*, as well as studies that permitted the analysis of the value
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of specific incentives or incentive combinations deployed to encourage knowledge sharing in organisations.

A synthesis of the earlier work provides an overview of the research topic. Material drawn from the review led to the development of a taxonomy of incentives for knowledge sharing using ICTs (described in more detail below), and provided the context for identifying data collection requirements, as well as creating the data collection tools for the primary research. The inadequacies of the existing published research on the specific role of the intranet in knowledge sharing - as discussed later in this chapter - necessitated the adoption of a broad approach for the research described in this thesis. This takes the form of a sociotechnical analysis. The approach is outlined and justified on pages 23-32 with reference to the literature of the domain.

2.2 Knowledge sharing

2.2.1 Main research interests in knowledge sharing

The topic of knowledge sharing is well established in the knowledge management literature. It is highlighted as an important area for knowledge management research (Holsthouse, 1998, p. 277), as well as a concern of knowledge management practitioners (Prusak, 1999, p. 6). In particular, results from case study reports emphasise that knowledge sharing is key to research in knowledge management. Cohen (1998), for example, refers to 100 knowledge projects, most of which had as one of their three main aims that of developing “a knowledge-intensive culture by encouraging and aggregating behaviors such as knowledge sharing (as opposed to hoarding) and pro-actively seeking and offering knowledge” (Cohen, 1998, p. 27). Similarly, a study of 431 US and European organisations cited “Changing people’s behavior” as one of the biggest difficulties of knowledge management (Ruggles, 1998, p. 87). Research shows that if knowledge sharing is not attended to as part of a knowledge management programme, then it will fail as soon as the person championing knowledge management moves on to another project, or resources are pulled (Huysman & De Wit, 2002, p. 163). Knowledge sharing *in particular* is therefore regarded as key to knowledge management *in general*.

Research work on knowledge sharing is often described with reference to particular goals of enhanced organisational capabilities. The power of knowledge sharing to turn a range of individual competencies into a collective resource to support subsequent action is acknowledged (Huysman & De Wit, 2002, p. 33). Huberman and Hogg (1994), for example, focus on one of the most frequently cited goals: improved organisational learning. They present a “detailed model of collaborative performance enhancement and examine its consequences for the community as a whole” with direct reference to informal networks supported by incentive schemes as facilitators of learning and problem solving “enhanced by exchanging information” (pp. 2-3). This approach is also illustrated in several papers presented at the annual European Conferences on Organisational Knowledge, Learning and Capabilities (OKLC), for example the work presented in 2002 on knowledge sharing in inter-organisational communities of practice

(Huang, Newell, & Galliers, 2002). Equally Huysman & De Wit's (2002) monograph is written from the perspective that knowledge sharing forms the basis for organisational learning (p. 23).

New knowledge creation or "knowledge development" (Huysman & De Wit, 2002, p. 68), and innovation, are also considered desirable outputs of knowledge-sharing activity. For example, Janssen (2000) recognises knowledge as a key contributor to innovation processes and, in a study of new product development, Thomson and Heron (2002) consider knowledge sharing that contributes to the output of knowledge creation as desirable citizenship behaviour. The growing body of literature on collaborative software development, for example Scott & Kaindl (2000, p. 119) - and especially that which considers open source communities (for example, Bergquist & Ljungberg, 2001; Lerner & Tirole, 2002) - pays heed to the importance of knowledge sharing and the need to facilitate it. A related desirable is that of knowledge reuse, where the goal is to *prevent* people being creative and innovative when what they intend to do has already been achieved elsewhere in the organisation, as identified by Huysman & De Wit (2002, p. 67, p. 95). This is particularly important in consultancy firms that make more profit when they are able to reuse methodologies to meet client needs (p. 89). It is not always easy, however, to persuade people of the benefits of knowledge reuse when they are of the opinion that only a solution that they invent from scratch can meet their needs (p. 134). Practitioners who look at means of measuring and managing intellectual capital - as popularised by models advocated in the business press (for example, Edvinsson, 1997) - especially recognise that knowledge sharing needs to be treated as a strategic issue (p. 23). Some companies have gone as far as attempting to calculate the value of time spent knowledge sharing. For example, at Shell, it is believed that for every hour a person is engaged in knowledge sharing, seven hours are provided in return (p. 99).

Whilst organisational learning, problem solving, knowledge creation and innovation, and avoiding "wheel reinvention" are the most prominent goals of knowledge-sharing initiatives in previous studies, work with other priorities also provides close discussion of the topic. For example, the degree of knowledge sharing between partners in an outsourcing agreement is evaluated as a critical success factor of company-to-company relationships (Kern & Willcocks, 2000). Equally, studies of knowledge transfer can form a platform for further aspects of interest to research in knowledge management. For example, features of knowledge embeddedness - such as absorptive capacity, network capabilities and collaborative know-how - in strategic alliances between firms have been examined in this way (Neilsen, 2001). Equally, material that discusses organisational learning as its main theme pays heed to issues of knowledge sharing. This is illustrated, for example, in the September 2000 special issue of the *Journal of Management Studies*.

Some work goes as far as to give the impression that knowledge sharing *equates with* knowledge management. For example, Huysman & De Wit (2002) declare that they deliberately employ the term "knowledge-sharing" in place of "knowledge management" in their studies (p. 5), claiming that knowledge management is merely "the management of knowledge-sharing processes" (p. 27).

The literature therefore shows that knowledge sharing is regarded as an important element for the enhancement of organisational capabilities, and such activity underpins efforts in improved product and services delivery, as well as offering less tangible outputs. Thus it is not surprising that the identification of motivational factors of knowledge sharing is noted as a priority area for individual companies (for example, Smith & Farquhar, 2000, p. 27). The goal is to depose the belief that “knowledge hoarding is power” in favour of one that states that “knowledge sharing is valued” (Kelleher & Levene, 2001, p. 39). Indeed, to some, the encouragement of employees to contribute knowledge is more important than the issues related to its capture, storage and dissemination (see, for example, Boisot & Griffiths, 1999). In short, the literature shows that organisations seek ways to encourage individuals, who have complete discretion over how they handle their knowledge assets, to use them for the benefit of the firm by sharing what they know openly and freely. The goal is to provide straightforward access to common resources so that employees can (1) execute routine tasks quickly; (2) aggregate previously disconnected pieces of information to facilitate innovation in working practices, product design or service delivery; (3) be liberated from the fear of losing important intellectual assets if valued colleagues leave the firm. Organisations want to discourage knowledge hoarding – both wholesale and partial - and knowledge loss caused by employee departure. The factors that can support this, as derived from the analysis of the literature on knowledge sharing, can be presented as a taxonomy of incentives.

2.2.2 A taxonomy of incentives for knowledge sharing

The work completed for this chapter led to the development of a taxonomy of incentives for knowledge sharing. It was constructed through the examination of a number of mainly qualitative studies, a large proportion of which detail individual cases. Typically, these studies tend to focus on barriers to knowledge sharing, rather than enabling factors. The identified incentives for knowledge sharing range from direct employee rewards to enabling conditions such as project structures or the cultural environment within firms (Von Krogh, 1998, p. 136). The appropriateness of each type of incentive - as far as it is discussed in the literature – is examined in this review. The resulting framework informed the development of the primary data collection tools for the research described in this thesis. The incentives for knowledge sharing are mapped out below, according to the categories of the taxonomy. Rewards and enabling conditions are considered first on pages 6-17. Factors specific to ICT and intranets and knowledge sharing are covered on pages 17-23. Boundary infrastructure is discussed in the context of sociotechnical approaches to research into ICTs on pages 29-32.

2.2.2.1 Rewards as incentives for knowledge sharing

Chapter 2 of the business text *Working knowledge* (Davenport & Prusak, 1998) provides an overview of knowledge sharing in a knowledge “market”. Individuals trade resources in an environment that is supported by an adequate infrastructure (Davenport & Prusak, 1998, pp. 25-52). Nahapiet & Ghoshal (1998) also discuss this concept. In the market place it is assumed that knowledge is a private good. It is at the discretion of the owner of the good(s) to decide whether or not to share it(them). Knowledge sellers calculate the worth of sharing their

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knowledge with knowledge buyers. Knowledge buyers work out whether they are able to offer something in exchange. Each party weighs up benefits of the potential exchange: "people's time and energy are limited and they will choose to do what they believe will give them a worthwhile return on those scarce resources" (Cohen, 1998, p. 31). It can be argued that in the context of an *organisational* knowledge market, the knowledge seller is usually an employee and the knowledge buyer is often perceived as the firm. For this reason some are of the opinion that organisations should explicitly offer to repay individuals who engage in knowledge-sharing activity (Samitt, 1999, p. 50; Van der Spek & Kingma, c2000, p. 27).

For the purposes of the work discussed here such repayments are classified as (1) "hard/explicit" rewards and (2) "soft" rewards. Some rewards are more appropriate for individuals than for groups and vice versa. Although Huysman & De Wit (2002) claim that "tangible experiences with rewarding knowledge-sharing are still not actually available" (p. 91) many organisations run rewards programmes.

The purpose of providing hard/explicit rewards is apparently straightforward. The idea is that individuals are motivated (to knowledge share amongst other things) through commitment, and pay is used as a fair exchange. Coleman (1990) visualises a repayment system where obligations are represented as credits to be traded between individuals. There must be an exchange at some point, otherwise donors will withdraw their participation: they will not support free-riders (Dyer & Nobeoka, 2000, p. 349; Weisband, Schneider & Connolly, 1995, p. 194). Three main categories of hard/explicit rewards have been identified. The first two types of reward (financial rewards and career advancement/security) rely more on structured organisational interventions than the third (access to information and knowledge).

Perhaps the most obvious explicit reward systems for knowledge sharing are those which involve economic incentives such as increased pay, or bonuses in the forms of cash or stock options. Such incentives might include a skills-based pay system and shared rewards in order to pull all workers into a shared community of purpose. These systems are designed to ensure that knowledge originators do not feel cheated when others make money from subsequent commercial gains and "companies recognize sizable productivity gains driving profitability that can be captured in not having to re-create the proverbial wheel" (Berry, 2000, p. 45). Systems for awarding economic rewards for knowledge sharing are not necessarily tied to financial indicators such as increased revenue or stock values. Huysman & De Wit (2002) refer to small gestures that organisations might make to their top knowledge sharers such as laptop computers or weekends in luxurious holiday resorts (p. 137). Beer & Nohria (2000) highlight companies that work on commitment-based contracts with their employees. Strong supporters of financial rewards recommend that they are built into systems design: "{e}conomic findings need to be factored into the design of knowledge management technologies" (Ba, Stallaert, & Whinston, 2001, p. 233).

Career advancement can be tied to various factors, including the extent to which individuals hoard or share their expertise (Von Krogh, 1998, p. 140). With specific reference to the building

of online tools for knowledge sharing, it has been suggested that in some circumstances workers might actually sabotage systems over fears of job security (Davenport & Klahr, 1998, p. 206). For this reason, some firms have used career advancement as an explicit reward for knowledge sharing. An individual's performance, as well as the act of helping other colleagues to perform well, is acknowledged. The reward may be at the level of assigning active knowledge sharers to preferred projects or providing them with additional training at their request (Kelleher & Levene, 2001, p. 50). It might be formalised into career development. This could be, for example, through the consideration of the extent to which a person knowledge shares at job performance evaluation time (as is the case at Cap Gemini (Huysman & De Wit, 2002, p. 79)), or taken into account when an individual's promotion prospects are discussed (Hargadon, 1998, p. 255).

Another tangible reward for those participating in knowledge-sharing ventures is access to the information and knowledge shared by the other contributors to enhance individual learning (Huysman & De Wit, 2002, p. 165). There is "the expectation... that one will get valuable knowledge in return for giving it... you need to contribute knowledge to become part of the knowledge networks on which your success depends" (Cohen, 1998, p. 31). Individuals in a knowledge-sharing group have access to "the collectively-owned capital, a 'credential' which entitles them to credit, in the various senses of the word" (Bourdieu, 1986, p. 249) through their ties. The quality of the informal information accessed in this way is often regarded as superior in industry (Hall, 1994). As well as learning from their direct contacts participants enjoy *privileged* access to information and opportunities obtained through "weak ties" (Granovetter, 1973) and "friends of friends" (Boissevain, 1974; Nahapiet & Ghoshal, 1998, para 6) in the knowledge market.

Participation in a knowledge market is suggested as a valuable activity in a number of environments for various applications. For example, in studies of knowledge sharing in the pharmaceutical industry, at a company level collaborations are often instigated with the goal of acquiring new, specialist knowledge (Hamel, 1991) with the expectation of resultant faster innovation (Powell, 1998, p. 230). It has been shown that "successful firms {position} themselves as the hubs at the center of overlapping networks, stimulating rewarding research collaborations among the various organizations to which they are aligned, and profiting from having multiple projects in various stages of development" (Powell, 1998, p. 230). Internal expertise and learning capabilities can be benchmarked against those of collaborator firms (Powell, 1998, p. 231). In the academic setting the generation of research ideas depends upon similar conditions (Cronin, 1995, p. 6).

It can be seen that the third hard/explicit reward of access to information and knowledge is less dependent on organisational initiatives than the first two. The quality of potential rewards derives from the co-reciprocal contributions of the actors in the knowledge-sharing system, rather than any interventions by those observing and managing its operation.

Employers can offer “reward” in more subtle ways than those cited above. These less tangible soft rewards play on the human obsession with reputation and status: “we feel cheated when our good deeds go unnoticed, and refrain from bad deeds lest they become known” (Nowak & Sigmund, 2000, p. 819). The non-economic incentives here rely on the recognition of the knowledge-sharing activity of an individual (Huysman & De Wit, 2002, p. 137, p. 165). Peers and superiors play an important role in bestowing status on their colleagues. Equally, the level of individuals’ *personal* satisfaction in knowledge sharing is important. For example, in studies of individuals informally sharing information found for others on the World Wide Web, reputation enhancement *in the eyes of others* have been shown to be less a factor of motivation than individuals’ own feelings of self-worth. In being able to find information of relevance to their contacts they feel triumphant with regards to their information seeking skills and efficiency. The act of sharing gives them an opportunity to demonstrate their prowess (Rioux, 2000, p. 72). Cohen and Prusak (2001) refer to “the human need for membership and identification, the satisfaction gained from recognition by peers, the pleasure of giving as well as getting help” (p. 7). The achievement of enhanced reputation may also apply to *collective* ambitions. For example, effective newsgroups can promote the membership as a whole, as well as individual subscribers (Wasko & Faraj, 2000, p. 168).

Since career progression depends to some extent on reputation and earned status, providing rewards that promote reputation might be seen as a more subtle flavour of the explicit reward of career advancement/security as discussed above. These are often tied together since increased visibility can lead to more interesting work in the future (Huysman & De Wit, 2002, p. 68). Earlier studies have shown that recognition of reputation leads to greater productivity. For example in a study of scientists involved in drug development it was found that the more emphasis that was placed on staff publications and external reputation the faster was the rate of new products to market (Henderson & Cockburn, 1994). Personalised recognition is shown to be a factor that speeds up knowledge flows between research and development staff and technology-cycle times and “far-outpaced extrinsic or financial incentives” (Judge, Fryxell & Dooley, 2000, p. 38). Since reputation and status-building can be perceived as long-term projects, groups comprising individuals who recognise this are more likely knowledge share from the outset, and knowledge sharing becomes embedded in work practices. This is illustrated in online discussion groups where individual participants are aware that it is possible that they might come across other group members, perhaps in a different capacity in the “real” world, in the future. For this reason they have an obligation to demonstrate - in the present - the qualities of “the helpful member” of the online community (Wasko & Faraj, 2000).

Perhaps the most straightforward means of offering soft rewards related to status and reputation is to thank and recognise knowledge contributors (Kelleher & Levene, 2001, p. 50). This can be achieved through informal means such as showing gratitude or flattery (Von Krogh, 1998, p. 147), or through official practices, for example by documenting the authorship of resources on electronic information systems (Smith & Farquhar, 2000, p. 24). In doctoral research on the benefits of academic Internet discussion groups, which highlighted discipline differences in their

operation and factors that determine their success (including levels of co-operation), reputation gain was found to be a stimulator of discussion group participation. This was more powerful than any form of reciprocal relationship between members (Matzat, 2001, p. 243 and p. 249). More sophisticated approaches to bestowing reputation include the encouragement of team working where project members are at different stages of their career. Reputation can be “given” by a higher status actor to another of lower status through the act of collaboration in academic work (Beaver & Rosen, 1978, p. 69) and in business both at the level of the firm (Powell, 1998, p. 231) and that of the individual (Berry, 2000, p. 45).

It also has to be acknowledged that some people simply gain pleasure as result of demonstrating their own altruistic and pro-social behaviour, and often also enjoy seeing the positive results of their efforts (Rioux, 2000, p. 71-72; Wasko & Faraj, 2000, p. 166). They are predisposed to this type of behaviour (Huysman & De Wit, 2002, p. 172). It might be concluded, then, that the selection and recruitment of the “right” type of staff underpins the operation of soft reward systems. Kelleher and Levene (2001) cite a professional services firm that “tries to ensure that recruitment policy and practice reflect the people types who thrive on knowledge creation, sharing, idea generation, and experimentation” (Kelleher & Levene, 2001 p. 85).

Although many advocate the use of rewards to motivate knowledge sharing, there is the danger where such schemes are in operation that individuals may appear to be contributing *something*, but what is *not* being contributed is more significant. This may be unintentional on the part of individuals, perhaps due to the environment in which they are situated (Von Krogh, 1998, p. 143) or deliberate (Dyer & Nobeoka, 2000, p. 348). According to the literature this would appear to be more significant when reward systems are in operation (Leonard & Sensiper, 1998, p. 123; Von Krogh, 1998, p.142). It is also important that the incentives for knowledge sharing match the spirit of what is to be achieved (Sawyer, Eschenfelder, & Heckman, 2000, p. 184). This is illustrated in case studies where employees are encouraged to buy into the idea of a culture of knowledge sharing even though this is at odds with the practice of rewarding individuals for their personal knowledge (for example, Newell, Scarbrough, Swan & Hislop, 1999, section 2.5; Orlikowski, 1996).

2.2.2.2 Enabling conditions as incentives for knowledge sharing

A number of studies (for example, Cohen, 1998; Constant, Kiesler & Sproull, 1994; Ruggles, 1998) refer to the encouragement of knowledge sharing with particular emphasis on strategies to change people’s behaviour through the provision of certain *conditions* rather than extrinsic reward systems. Indeed “some thinkers now reject the whole idea of formal rewards for knowledge, on the grounds that, in practice, such mechanisms produce the very opposite of the behaviour they were intended to produce” (Kelleher & Levene, 2001, p. 50). It is claimed that “{s}ystems based on extrinsic rewards quickly turn moral obligation into acts of self-interest, and could potentially destroy the open provision of knowledge in a community” (Wasko & Faraj, 2000, p. 170). Over-reliance on rewards is harmful to an array of desired organisational behaviours: “{it} provides temporary compliance, ruptures work relationships, inhibits

organizational learning, discourages risk taking, and undermines interest in the work itself” (Judge et al., 2000, p. 44). Huysman & De Wit (2002) are concerned that organisations that follow the strategy of providing rewards fall victim to what they label the “individual learning trap”. Here the benefit to the individual is gained at the expense of the collective (p. 9). A positive attitude towards knowledge sharing, rather than anticipation of reward, was found to be the more significant motivational factor of knowledge exchange in the results of a survey conducted with 467 employees in four large public sector organisations (Bock & Kim, 2002).

The environments believed to be most conducive to aggregating desirable behaviour are identified as those that:

- make the acquisition and dissemination of knowledge an explicit responsibility;
- treat all contributions as potentially valuable, regardless of originator’s position in the organisational hierarchy;
- encourage experimentation;
- create a sense of community amongst employees;
- respect the employee perspective.

Unlike the earlier examples, they do not rely on the straightforward reciprocity of individuals trading knowledge as a private good. Rather, they provide conditions in which knowledge can begin to be regarded as a *public* good. In these circumstances exchanges are motivated by moral obligation and community interest, rather than self-interest (Wasko & Faraj, 2000, p. 155). Much of this depends on “the centrality of social interaction – of trust, personal networks, and communities – to work of virtually all kinds” (Cohen & Prusak, 2001, p. 7). Huysman & De Wit (2002) point out that although it is important to make changes in organisations to meet these conditions, this does not require alterations to organisational structures, positions etc. Aspects of each of these organisational incentives are discussed below.

It has been argued that knowledge sharing is more likely to be encouraged in employees who know that this is a requirement of their jobs and that to knowledge share is an entirely legitimate activity (Bruce, 2000; Constant et al., 1994, p. 401; Davenport, 1997, p. 207; Davenport & Klahr, 1998, p. 207; Liedtka et al, 1997, p. 54; O’Dell & Jackson Grayson, 1998, p.157; Sawyer et al., 2000, p. 201). The view which prevails in the studies that recommend making knowledge sharing an explicit responsibility is that it makes such activity routine, rather than a separate task (Huysman & De Wit, 2002, p. 1, p. 163). There are two main responsibilities for the individual: (1) to acquire expertise and (2) to disseminate it (Von Krogh, 1998, p. 144). When knowledge sharing is not promoted as a responsibility, it is argued, it is less likely to occur. For example, a study of distributed technical support staff at a university explains that the group members were not obliged to share knowledge within the group and this accounted in part for the lack of knowledge sharing within the group (Sawyer et al., 2000, p. 194).

Some major knowledge management initiatives work against promoting knowledge acquisition and dissemination as an explicit responsibility. Many large companies, for example Cap Gemini (Huysman & De Wit, 2002, p. 75) and the Dutch financial services company NN (Huysman & De
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Wit, 2002, p. 57) have employed a layer of knowledge managers as part of their knowledge management implementation. One of the primary goals of such staff is to facilitate knowledge sharing within the organisation. This may raise the visibility of corporate commitment to knowledge management and knowledge sharing. However, it can also reinforce the view that knowledge sharing is a separate task. It gives the impression that knowledge sharing is the responsibility of just one set of specialists employed for the purpose (Huysman & De Wit, 2002, p. 147).

Citibank provides a good example of why organisations make the acquisition and dissemination of information and knowledge an explicit responsibility. It demonstrated that assigning *specific* responsibilities to particular individuals is more likely to encourage knowledge sharing than simply expecting people to make contributions as part of a general team effort. It was not until the company assigned employees the responsibility of entering content on a particular database that the knowledge base began to grow (O'Dell & Jackson Grayson, 1998, p. 164). Time had to be set aside specifically for people to learn, share and help one another: "unless capturing and sharing information are built into the work processes, sharing will not happen" (O'Dell & Jackson Grayson, 1998, p. 157). Similarly, Cap Gemini's entire knowledge management system almost became defunct prior to responsibilities for its maintenance being allocated to named parties (Huysman & De Wit, 2002, p. 75).

In the discussion of *rewards* as incentives for knowledge sharing on page 9 it was argued that offering enhanced status and reputation is a means of encouraging knowledge sharing. However, in the context of a discussion of *enabling conditions* as incentives for knowledge sharing it can be argued that status should be relegated. This is because studies have shown that status *similarity* is positively related to knowledge sharing (Cohen & Zhou, 1991). Actors operating as equals (or enjoying the perception of equality) tend to knowledge share. Such studies advise organisations to play down the idea that the higher the status of an individual the more valuable their knowledge is. If this message can be spread widely, those who would normally be too shy to contribute, or to seek out the knowledge of others due to the shame of exhibiting their ignorance, may respond by sharing their questions and answers (Hargadon, 1998, p. 225; Leonard & Sensiper 1998; Wasko & Faraj, 2000). With particular regard to electronic environments, studies have found that computer mediated exchanges lower social inhibitions and barriers to communication (Weisband et al., 1995, para 3, para 66). A positive factor in achieving this is the removal of obvious status cues of contributors (Weisband et al., 1995). An example from medicine demonstrates how undue regard to status can be detrimental to the extent of putting patients at risk. Leonard & Sensiper (1998) explain: "Nurses often hesitate to suggest patient treatments to physicians not only because doctors have higher status, but because nurses base their diagnoses on different knowledge bases ... the nurses' intuition about a situation draws on very different tacit knowledge, and they have neither the laboratory data to back up hunches, nor the status to insist on the validity of their perspective" (p. 124).

There are several means by which organisations can play down individual status in the expectation of improving knowledge-sharing capabilities. Some advocate the actual removal of management levels so that *position* power of individuals is replaced by *network* power of the group. Then everyone holds responsibility for knowledge sharing and employees can focus on pleasing customers rather than management (Kelleher & Levene, 2001, p. 42). Masking status - a less radical approach than altering management structures and easy to achieve in electronic environments - is a recommended strategy. This can be done by dropping inflated titles (Kelleher & Levene, 2001, p. 42) or by allowing anonymous contributions in electronic knowledge-sharing environments (Huysman & De Wit, 2002, p. 115; Stephenson & Davies, c2000). In 1995 Weisband et al. recommended, for example, that "an organization seeking to be 'flat' and to emphasize cooperation should probably not use an electronic mail program whose headers include names and organizational position" (para 69). It is interesting, however, that their experiments showed that conducting anonymous interactions online (as opposed to face-to-face) did not *automatically* result in participants regarding one another as equals, nor treating their contributions as of equal status. Indeed, in some cases wrongly attributed status led to the stereotyping of participants according to the believed characteristics of the mistaken identity. These results show that the relegation of status as a means of encouraging knowledge sharing is not a straightforward issue. (It should also be recognised that research findings on electronic environments published in 1995 may no longer be relevant.)

Perhaps a more "honest" approach is to create conditions that promote the ethos that "in a knowledge-based community everybody is a contributor and knows something useful" (Merali, c2000, p. 86). Here the focus is on the whole work force and not just the "key talent" (Kelleher & Levene, 2001, p. 42). Hargadon (1998) writes about staff developing an "attitude of wisdom" to make this work: "People who have an attitude of wisdom are cooperative because they are neither too arrogant nor too insecure to ask others for help. By actively seeking knowledge, people demonstrate they are humble enough to recognize the value of knowledge held by others yet are confident enough to seek it out, especially when this requires tacit admission of their own ignorance" (Hargadon, 1998, p. 225). This approach acknowledges that companies may capitalise on offering the soft reward of enhanced reputation and status in exchange for knowledge-sharing activity.

According to the literature, risk taking is important to organisations hoping to create new knowledge since "distinctly new knowledge comes from experimenting" (Fahey & Prusak, 1998, p. 272). Often organisations are constrained by established standardised approaches to collecting and structuring data, and to transferring information. This results in an emphasis on simply refining and sharpening what is already known (Fahey & Prusak, 1998, p. 272). Employees retreat into purely analytical modes of operating with "such strong preferences for analysis over intuition that no one dares offer an idea without 'hard facts' to back it up" (Leonard & Sensiper, 1998, p. 126). Permission to experiment at the local level is therefore important to the quantity of knowledge-sharing activity in an organisation. In environments that sanction experimentation there is "greater openness to the potential for value creation through exchange"

(Nahapiet & Ghoshal, 1998, para 63). Not only is the knowledge-sharing activity freer, but also the output of the interchanges is more valuable. For example, Sawyer et al. (2000) demonstrate that where trust is strong participants are more willing to expose themselves and ask questions in “clique markets” over an electronic discussion list. They explain that “{c}liques markets are private markets in which all parties have such credibility that all exchanges occur without hesitation. The seller automatically assumes that the buyer will reciprocate at some point in the future” (Sawyer et al., 2000, p. 196).

Organisational strategies to encourage knowledge sharing such as reward systems and the provision of certain conditions may be considered as deliberate managerial interventions. The creation of a sense of community might also be considered as a condition for enabling knowledge exchange. For those operating in communities the incentives for knowledge sharing are less concrete than the output of the reward systems described above. The incentives to share knowledge in communities are identified as the “carrot” of the continued vitality of the community and the relationships between partners, and the “stick” of obligation to other group members. It is quite likely that a sense of community emerges from interactions and cannot be created or engineered. Snowden (c2000) argues that the most common means of managing staff, which usually involves managers rewarding or chastising their charges according to their performance, is outdated. He quotes Drucker: “In the knowledge economy all staff are volunteers¹, but our managers are trained to manage conscripts” (Snowden, c2000, p. 9). To enhance knowledge sharing, Snowden (c1998) maintains, staff need to be managed differently as teams working in *communities* that operate under certain environmental conditions (p. 14). When individuals are encouraged to share knowledge in communities the barriers to knowledge transfer witnessed in cultures that value *personal* technical expertise and knowledge creation (as described by O'Dell & Jackson Grayson, 1998, p. 157 and Von Krogh, 1998, p.136) are weakened. Communities can promote strong ties (Galegher & Kraut, 1990; Hansen, 1999, para 14; Snowden, c1998, p.14; Wellman & Wortley, 1990) and social capital (such as shared norms, obligations, trust and identity) within groups to provide the important environmental conditions for enduring knowledge exchange (Constant et al., 1994; Huysman & De Wit, 2002, p. 166, p. 176). Actors who share identity are likely to share mental models, means of expression and behaviour, and can communicate together quickly, easily (and cheaply) (Teigland, 2000, p. 154). For example, research in a university setting has shown that when individuals hold strong beliefs of organisational ownership of their information and expertise, knowledge sharing is more likely to occur (Jarvenpaa & Staples, 2001). These conditions in turn support commercial achievement (Starbuck, 1992). Other studies discuss the significance of the “community of practice” as an organisational form that is driven in part by the desire to share expertise by interested and passionate participants (Davenport & Hall, 2001; Davenport & Hall, 2002). Some

¹ In recognition of the “voluntary” aspect of knowledge sharing, staff charged with eliciting content for intranets have been forced to devise means of doing so without appearing to nag. For example, a project leader at ING Barings invents pretexts for telephoning people and surreptitiously enquires about content development whilst giving the impression that his main reason for the telephone call is nothing to do with the intranet (Huysman & De Wit, 2002, p. 74).

of this work emanates from the domain of organisational theory, and places a specific focus on organisational learning as its output (for example, Easterby-Smith, Crossan & Nicolini, 2000; Fox, 2000).

Communities vary in their ability to foster knowledge-sharing activity. According to the literature, generating a sense of community *identity* is an important factor in this (Dyer & Nobeoka, 2000, p. 352; Kogut & Zander, 1996; Merali, c2000; Nahapiet & Ghoshal, 1998, para 68; Westphal & Azajac, 1997). Organisations, however, need to guard against developing a “silo mentality” (Kelleher & Levene, 2001, p. 40) amongst members when community building (Cohen & Prusak, 2001, p. 11, p. 15; Huysman & De Wit, 2002, p. 39; Nahapiet & Ghoshal, 1998, para 14). This is because knowledge creation opportunities are compromised in groups where members are too tightly bound (Hansen, 1999; Leonard & Straus, 1998). A second determinant of a community’s strength in supporting knowledge sharing is the degree of commitment, obligation and co-dependence amongst its membership (Merali, c2000, p. 81; Teigland, 2000, p. 156). This is largely dependent on trust and respect (Dyer & Nobeoka, 2000, p. 352; Huysman & De Wit, 2002, p. 133 Nahapiet & Ghoshal, 1998, paras 41, 62 and 64; Teigland, 2000, p. 156; Von Krogh, 1998). Support for social interaction is also widely noted as desirable in providing a context in which knowledge exchange can take place at the level of the community (Cohen & Prusak, 2001, p. 18 Frenzen & Nakamoto, 1993, p. 373; Galunic & Moran, 2000, p. 3; Huberman & Hogg, 1994; Huysman & De Wit, 2002, p.175; Powell, 1998; Rioux, 2000; Sawyer et al., 2000).

A further enabling condition for motivating knowledge sharing discussed by Huysman and De Wit (2002) is related to how managers present knowledge-sharing programmes to their staff. They should consider “whether the initiatives comply with both the organizational as well as the individual’s needs” (p. 135), bringing benefit to both (p. 132). If this is not the case, any initiatives fall victim to what Huysman & De Wit (2002) label the “management trap” (p. 9) and consequently suffer a short life-span (p.2). This is most commonly seen in organisations that focus on database repositories held on intranets as their main tools for knowledge sharing (p. 132). Huysman & De Wit (2002) cite a case where the head office managers of a company required local office staff to provide their details online. This was simply for the convenience of head office visitors to the branches. Compliance with this request was low since the employees’ perspective was that this was an additional chore that was of little benefit to local needs (p. 132). It is easier for some organisations to align individual and organisational needs. This is most obvious where the enterprise has a strong mission. Greenpeace and the World Bank are cited as examples of organisations that are able to promote knowledge sharing as in the interests of both parties (p. 135).

2.2.2.3 The relative value of incentives and incentive combinations for knowledge sharing as identified in the literature

One of the outputs of the analysis of the literature for this research is a taxonomy of knowledge sharing, as drawn from relevant material scattered across a range of publications. However, although it is evident that certain researchers favour particular approaches to motivate

knowledge sharing as discussed above, the literature reveals that it has been difficult for them to evaluate the effectiveness of individual incentives, or incentive combinations, amongst employees within firms. Huysman and De Wit (2002) believe that this is because few organisations have sufficient experience of facilitating knowledge sharing to be able to identify the best strategy (p. 137). Another reason why researchers have found it challenging to assign value to different approaches to facilitate knowledge sharing is that multiple incentives are deployed in practice: it is not easy to understand the relative merit of components in a mixed approach. For example, an organisation may appear successful at promoting the idea of knowledge as a public good (see page 11) due to efforts made to create a sense of community. It may be the case, however, that the award of stock options - a financial incentive - is having a greater impact in creating this sense of community in that such awards reward loyalty to the firm. The staff holding the options behave as a community primarily due to this hard/explicit reward, and not because they share strong ties or enjoy regular opportunities to work on joint projects with colleagues.

These difficulties are manifest in conflicting research results. For example, as can be seen above, previous work presents contradictory findings on the merit of status-related incentives: on page 9 it has been noted that some regard enhanced status and reputation as valid soft rewards for knowledge sharing, yet - according to the detail presented on page 12 - others advocate that status should be hidden. Views on the level at which incentives are awarded provide another example of disagreement amongst researchers. Since the goal of knowledge sharing is to encourage outputs that are most effectively generated by teams of individuals, some argue that the incentives should be presented at both the individual and team level (Kelleher & Levene, 2001, p. 50). In their future idealised communication system, however, Boland and Tenkasi (1995) reject individual rewards entirely in favour of group rewards (p. 366). Equally, conflicting advice is given as to whether measurements of knowledge sharing should be kept, when this can be seen as both an enabler (for example in attracting senior level support for initiatives) or a detractor that is impossible to achieve anyway (Huysman & De Wit, 2002, p. 177). Some work is even *self*-contradictory. For instance, Huysman and De Wit (2002) suggest that creating an incentive scheme linked to performance evaluation is the best option for an organisation that wishes to promote knowledge sharing (p.137) even though they appear to be opposed to "hard" rewards in general. For example, elsewhere they caution against employing rewards for knowledge sharing (p. 175).

These examples show that the identification of what is working, what is not working and what might work to encourage knowledge sharing is unlikely to emerge from a check-list audit. What is known, however, is that the choice of incentive, or combination of incentives, depends on several factors including, for example, the benefit sought or the characteristics of "knowledge owners". For example, it is generally thought that financial incentives achieve faster short-term results and are therefore useful to get projects started when voluntary knowledge sharing does not yet exist (Beer & Nohria, 2000; Huysman & De Wit, 2002, p. 91, p. 137). Once the decision has been taken to employ hard rewards, choices are made as to which particular types of

reward are appropriate and how to make them attractive. For example, Huysman & De Wit (2002) point out a practical problem associated with the “small gesture” type of “hard” reward, viz. coming up with a series of imaginative treats for those who deserve them (p. 137). Community building is seen as ultimately having a more significant long term beneficial effect by making knowledge sharing part of the routine (Constant et al., 1994; Huysman & De Wit, 2002; Janssen, 2000, p. 287; Snowden, c2000; Wasko & Faraj, 2000, p. 162) and networks that are social are regarded as more effective than those that are electronic (Huysman & De Wit, 2002, p. 2, p. 155). Firms may use a combination of strategies, and customise them according to the their current activities (Kelleher & Levene, 2001, p. 50).

2.2.3 Previous work on incentives to knowledge share: the research perspective

It has already been noted that the existing research on knowledge sharing is contradictory. That previous studies have been conducted in a range of different contexts is both a cause and consequence of this, indicating that knowledge-sharing practice is local. A further problem with previous studies is that the scope and output of published material provides few indications of the interplay between the various actors involved in knowledge-sharing activity. Rather, much of the research completed is presented from a managerial perspective with the purpose of suggesting “solutions” to perceived problems. This is evident, for example, in cases where it is advocated that incentives to knowledge share need to be managed with the help of hard/explicit rewards such as financial benefits as tools of the employing organisation.

Despite the fragmentary nature of the work completed to date, however, it can be seen that certain issues recur in the studies and are appropriate for further investigation. Some themes that merit deeper investigation have been noted by knowledge management researchers. For example knowledge management in groups (Huysman & De Wit, 2002, p. 4; Leonard & Sensiper, 1998, p. 115), and social capital and knowledge sharing are highlighted are worthy of attention (Huysman & De Wit, 2002, p. 167).

It can be concluded, then, that although there is a body of research on the factors that encourage knowledge exchange, current perspectives seem inadequate due to a lack of empirical substantiation of managerial prescriptions and conflicting findings, and therefore these themes are worth pursuing. However, a problem evident from the literature on knowledge sharing is that it does not present a single theoretical approach that can be employed for such research. This issue is addressed in further detail below on pages 23-32.

2.3 ICTs, intranets and knowledge sharing: main research themes

It has been noted above that some of the papers reviewed on knowledge sharing make specific reference to online exchanges, and, in some cases, to the role of the intranet in such activity. Some argue that the dominant view that ICTs can be employed to promote knowledge sharing is both pervasive and risk-laden (for example, Huysman & De Wit, 2002, p. 9). Much of the knowledge management literature (the majority of which resides in the domains of information

technology and systems (Huysman & De Wit, 2002, p. 152)) heralds ICT as the solution to all knowledge management problems, knowledge sharing included (Huysman & De Wit, 2002, p. 120). Equally computer hardware and software vendors promote a variety of products for knowledge management applications (Hall, 2001). Of these, intranets are identified most readily as key platforms for knowledge sharing, and as tools for formalising distributed cognition (Huysman & De Wit, 2002, p. 93; Jarvenpaa & Staples, 2000, p. 130). Amongst others, Leidner (2000) points out, however, that the “application of IT to knowledge management assumes that experts in the firm, if located by someone in need of knowledge, will readily share knowledge with intrafirm strangers” (p. 103). Earlier studies of organisations that have introduced information and communication technologies to encourage knowledge sharing have proved that often high expectations in ICT’s abilities to engender knowledge-sharing practice have been over-optimistic (Huysman & De Wit, 2002, p. 2, p. 172). For example, Orlikowski’s study revealed a failed Lotus Notes implementation where no provision was made for the use of the novel technology (Orlikowski, 1996). Equally Huysman & De Wit (2002) provide numerous examples of individuals circumventing ICT applications specifically designed for knowledge sharing. For example, at Cap Gemini while “top management was busy talking about the need to introduce knowledge management and the need to use Cap Com and Galaxy {the local and international intranets} to share knowledge, a continuous process of knowledge-sharing amongst consultants was already taking place behind the scenes” (p. 165). These authors also point out that although the potential of sophisticated ICT tools is acknowledged, few organisations actually employ them in practice (p. 17).

There have been some attempts to develop a specific theoretical framework to explain the role of ICTs in information and knowledge sharing. For example, research performed in the early 1990s by Constant, Kiesler and Sproull aimed specifically to understand the factors that encourage and inhibit information sharing in organisations that make extensive use of technology (Constant et al., 1994). They advocated support for an exchange and expressive theory of information sharing, drawing on the theoretical constructs of social exchange theory. This initial work has since been extended. In greater detail, Jarvenpaa & Staples (2000) consider contextual aspects of information and knowledge sharing such as the information culture of organisations and task interdependence of individuals. However, these two authors express surprise that not many others have built on Constant et al.’s work. They explain that they found “very few articles that make reference to the Constant et al.’s theory of information sharing and have been unable to locate any substantive extensions to the work” (Jarvenpaa & Staples, 2000, p. 148). They complain that the “Constant et al. theory is an important piece of work that has yet to receive the attention that it deserves in information and knowledge management literature” (Jarvenpaa & Staples, 2000, p. 148). (This body of work is discussed in further detail on page 23 below with reference to the adoption of a theoretical framework for the research described in this thesis.)

Whilst Jarvenpaa and Staples’ complaint is valid with specific reference to the work of Constant et al., it would be incorrect to conclude that the theme of knowledge sharing supported by

technologies has been ignored completely in the research literature. Rather, the simple explanation is that not all recent work has been tied with the earlier work of Constant et al. There are several studies of intranets as platforms for (and inhibitors of) knowledge sharing across distributed organisations, (for example, Hendriks, 1999; Newell et al., 1999; Newell, Scarbrough, & Swan, 2001). Many of these share the conclusion of Newell et al. that “knowledge-sharing via intranet technologies may be most difficult to achieve in contexts where knowledge management is the key objective” (Newell et al., 2001, p. 97). There have also been some sophisticated attempts to explain knowledge-sharing practice across computer networks. For example, Faraj and Wasko (c2001) have attempted to model knowledge transactions from a social capital perspective and Gray and Meister (2001, May) have examined economic self-interest in discussion groups. Other work has looked at the impact of knowledge sharing in distributed organisations on specific outputs. For example, Pedersen & Larsen (2001) consider the value of decision support systems in health care administration in an environment that supports distributed knowledge management. It is fair to say, however, that the literature reveals that there is the potential to contribute much more to the debates around knowledge sharing supported by technology. It is also worth noting that no significant empirical studies have been published on the role of the intranet in knowledge sharing in large partnerships, such as KPMG. New research can take into account some of the earlier work that has been deemed worthy of further extension, and build on what is already known on the role of the intranet in knowledge sharing, as outlined in further detail below.

2.4 Determinants of the role of ICTs in knowledge sharing

The analysis on the determinants of the role of ICTs in knowledge sharing presented here is based on studies that discuss ICTs and knowledge sharing as their main theme, as well as some which consider this issue as part of the debate of a larger topic. The approach considers ICTs as suppliers of technical infrastructure for individuals and groups in organisations that wish to encourage knowledge sharing. The general consensus is that an ICT on its own cannot be regarded as an enabler of knowledge-sharing activity: “If people do not like to share knowledge, ICT tools will not change their minds. And if the opposite is also true, if people want to share knowledge, they will use whatever is at hand to support it” (Huysman & De Wit, 2002, p. 172). The provision of facilities is only part of a much larger complex. As Huysman & De Wit (2002) also note “Communities do not exist thanks to ICT, but ICT might offer good support to communities; especially where people or groups who are distributed over a wide geographical area are concerned” (p. 122-123). According to the literature (1) ease of use, (2) articulation of the system with the work environment and (3) the generation of critical mass determine the value of an ICT tool as a platform for knowledge sharing. Each of these themes is considered in turn.

In general, individuals are motivated to act when (1) it is easy to do so (Snowden, c2000, p.10) and (2) the usefulness of acting is obvious (Huysman & De Wit, 2002, p. 120, p. 140, p. 158; Snowden, c2000, p.10). This factor connects to the need for sponsorship from top management to support knowledge-sharing initiatives in cases where they are concerned with seeing

evidence of the value of a knowledge-sharing system, often expressed in quantitative measures (Huysman & De Wit, 2002, p. 148). Convenience and perceived potential benefit are by no means unique to knowledge sharing, but applicable in much of everyday human activity. Whether it is easy (or not) to knowledge share depends on the method by which potential contributors contribute, and whether this creates opportunity for parties to make a knowledge transaction (Nahapiet & Ghoshal, 1998, para 38). In the case of online systems, the interface presented to potential contributors is important: "sharing should... be higher when the technology attributes and conditions decrease the psychological costs of sharing (e.g. user friendly systems)" (Jarvenpaa & Staples, 2000, p. 131). Systems that are difficult to use may impede the growth or critical mass (Huysman & De Wit, 2002, p. 90), as discussed further on page 22 below.

Earlier studies provide examples of means that could be employed to enhance ease of contribution to systems for knowledge sharing. It may simply be the case of respecting attachment to legacy systems (Huysman & De Wit, 2002, p. 177) or staff training. For example, Huysman & De Wit (2002) attribute the failure of discussion groups set up to facilitate knowledge sharing at one of their case study organisations - the Ministry of Housing - to the simple fact that civil servants were not used to working with this form of communication (p. 153). Other strategies consider the mechanisms of acquiring content for the shared system. For instance, if intranet content is to be gathered from a variety of contributors by another colleague whose job is to make information available online, a single mailbox account on the same system as that used by the contributors could be used for channelling new content to the system. The only extra piece of information with which the contributors need to become familiar is an additional e-mail address. This is illustrated at Schlumberger where contributions to an online project archive are facilitated because "the software is simple enough so that the effort required of members is minimal, not much more complicated than storing the information on their personal computers, which of course they are already doing" (Smith & Farquhar, 2000, p. 24). Facilities that allow input to shared information systems that replicate patterns of speech might be expected to attract greater participation than those that require users to spend time reformatting ideas before submitting them to an electronic knowledge base. This is because "individuals are generally better speakers than they are writers" (Kransdorff, c2000, p. 78). Poor systems design, however, can be compensated for by other conditions. For example, poor systems design has been found to be less of an obstacle to knowledge sharing in communities where there is strong social capital in the form of trust between members: "early dislike and poor performance with a system can give way, over time, to mastery and even preference for the poor system over a better-designed alternative" (Dillon, 2003, p. 29).

Previous studies have also concluded that tools for knowledge sharing need to fit in with the context of the organisations they seek to serve: "without adaptation of the technology to the context and vice versa ... the technology will not reflect local conditions or communication norms and hence be underutilized or inappropriately utilized" (Orlikowski, Yates, Okamura, & Fujimoto, 1995, p. 424). This view is supported by others, for example Huysman & De Wit

(2002, p. 89) and Newell et al. (1999, p. 8). Brown and Duguid (1998) take the theme further when they argue that tools for knowledge sharing should be integrated into communities to match the levels of formality operated at the level of work groups. They are critical of new technology that is supposedly meant to help knowledge management efforts when in fact it simply “attends primarily to individuals and the explicit information that passes between them” (Brown & Duguid, 1998, p. 105). If this advice is not heeded in systems design, contributions to the knowledge bases held on intranets will lose the opportunity to provide information derived from socially-embedded, and often the more valuable and unique, know-how of colleagues. They will simply reinforce a “stock” approach to knowledge management (Huysman & De Wit, 2002, p. 151). This problem is compounded if the organisation seeks to “control” the use of electronic media (Boland & Tenkasi, 1995, p. 359; Brown & Duguid 1998, p.106; Newell et al, 1999, section 4; Orlikowski et al., 1995, p. 424; Scheepers & Damsgaard, 1997, p. 16). Such interventions, suggest Brown and Duguid (1998), are the electronic equivalent of monitoring chat at the water cooler or coffee pot (p. 106). This view is in line with the findings of Newell et al (1999, section 4) and Boland and Tenkasi (1995): “Communication systems must... support diversity of knowledge through the differentiation provided by perspective taking within communities of knowing” (p. 359). Local control – in terms of content, branding and location and use of shared resources - is important to establish and maintain “badged” identity: common interfaces can be regarded as sterile in comparison. In a more recent study it was discovered that heavy information users and sharers prefer structured information flows. It is suggested that this is because they require reliable access to information and knowledge of others (Jarvenpaa & Staples, 2000, p. 129). Equally, it is suggested that ICTs should be designed to fit in with existing incentive schemes. For example, when career progression and reputation building are seen as potential rewards for knowledge sharing, it is proposed that online systems such as intranets should make obvious resource ownership, protection and management in terms of the control, location and branding of content. This is because systems of incentives need to be seen to be fair (Dyer & Nobeoka, 2000, p. 348; Miles, Miles, Perrone & Edvinsson, 1998, p. 286; O'Dell & Jackson Grayson, 1998, p. 164; Wasko & Faraj, 2000).

A case study of the Chevron Corporation illustrates how important it is to match the system with the context of the organisation. Here a *partial* intranet solution was created for sharing information on good practices. This was instigated after the failure of a scheme where people were expected to record their experience online. It was felt that really important and useful information for improvement is actually too complex to put online so the solution was to provide a pointer database that would allow users to identify potentially helpful individuals named on the system and encourage follow-up off-line (O'Dell & Jackson Grayson, 1998, p. 164).

It has been recognised that multiple contexts are required for the creation of a knowledge market for exchanges. For example, people like social contact with an originator from whom they can learn further insights through a personal interaction prompted by access to meta-knowledge (Huysman & De Wit, 2002, p. 134, p. 139, p. 159). Studies that reach this conclusion acknowledge earlier work in knowledge management on the “shareability” of knowledge

(Nonaka, 1994, p. 20). The whole network's ability to share knowledge is dependent on the individuals' meta-knowledge of network members' expertise; ready access to such expertise; the willingness of members actively to engage in problem solving and the ease with which safe relationships are formed (Cross, Parker, & Prusak, 2000, August).

The adoption of an intranet as a knowledge-sharing tool represents a change in organisational practice. For many at the initial stages of encouraging employees to adopt any new way of working there is a particular dilemma. Employees will not feel encouraged to participate until they believe that participation is worthwhile (Nahapiet & Ghoshal, 1998, para 39). In the case of knowledge sharing, employees will be reluctant to participate until they believe that what they might share will be used. Nor will they draw on the shared expertise of others if what is being offered is not believed to be useful. If employees can be convinced of the usefulness of the initiative they will feel more motivated to participate and help it develop. One way of convincing employees of the usefulness of an intranet is to promote the credibility of sources made available by recognising and publishing the names of contributors (Smith & Farquhar, 2000, p. 29). (This adds to the arguments that contributors need to be acknowledged to promote reputation as described on page 9, and to encourage the idea that the system is integrated with the community it serves, as outlined above). Another means of demonstrating the system's usefulness is to force employees to use it by making it the sole platform for particular applications (Lamb, 1999, section 5.1).

Ignorance of the concerns related to matching tools with community needs and expectations at the implementation stage endangers the goal of early achievement of critical mass (Newell et al., 1999, p. 2). Scheepers & Damsgaard (1997) note that "Implementing an intranet that impacts too heavily on the established social structures in the organization, can lead to rejection and we thus caution against "big bang" approaches... {but} a too small effort runs the risk of not being enough to convince users of the intranet's potential. Thus the challenge is to determine the critical mass required for the "institutionalization of the intranet" (p. 16). This critical mass is an emergent feature, determined by the community itself. A case study of ING Barings found that the creation of critical mass proved to be the best way to stimulate active participation in the system set up for knowledge sharing (Huysman & De Wit, 2002, p. 74).

2.5 Previous work on the role of the intranet in knowledge sharing: the research perspective

The analysis of the literature that pertains to ICTs and knowledge sharing presents a set of observations, but no unifying theory, and the role of the intranet in knowledge sharing is not clear. As is the case with the material on knowledge sharing in general, the results of studies on ICTs and knowledge sharing emanate from a variety of settings that occupy different organisational contexts, and none relate to large partnership firms. Previous research does not pay attention to the roles of those charged with managing the processes of knowledge sharing using ICTs. The few studies that address the topic of facilitating knowledge sharing with specific reference to intranets used in large, distributed organisations indicate that samples selected

have been too immature to generate useful findings (Huysman & De Wit, 2002, p. 145). The conclusions presented on the need to produce tools which are usable, articulate with the communities that they serve and support the generation of critical mass are, on the whole, delivered as managerial recipes. Of greater interest is the material which recognises that the adoption of ICTs for knowledge sharing brings with it risks. This is evident in the studies that present the intranet as a negative force in knowledge management (for example, Newell et al., 2001). This mismatch of managers' expectations of what an intranet might achieve in initiatives designed to encourage individuals to knowledge share, and the actual outcomes experienced by those who are managed, is highlighted as an issue that merits further investigation, along with other "second wave" interests of knowledge management related to the necessary conditions for knowledge management's institutionalisation (Huysman & De Wit, p. 164).

2.6 Accounting for the role of an intranet in knowledge sharing: pursuit of a theoretical framework

A barrier to meeting the aims of this research is that the literature on knowledge sharing does not suggest a theoretical approach that can be adopted to explore the role of the intranet in such activity. No theory on this topic has emerged in the classic way.

Only a small body of work, which can be traced back to the paper by Constant et al. (1994) already referenced in this chapter, hints that existing theory – social exchange theory - might be adapted to account for the role of ICTs in knowledge sharing (see page 18 above). A consideration of the publications that referenced Constant et al.'s work prompted an exploration of social exchange theory in the early stages of this research. The work completed is summarised in the article "Borrowed theory: applying exchange theories in information science research" (Hall, 2003) published in *Library and Information Science Research*. However, it became clear that social exchange theory did not fit well enough as a base for the entire investigation. The risk was that deliberately gearing data collection activity to extending social exchange theory would have resulted in a distorted piece of work. For this kind of research a broader approach that allows a more open-ended theoretical "template" is more suitable. A consideration of work that furnishes sociotechnical analyses of technology implementations led to a set of propositions to be used as a framework for the research.

The framework adopted draws directly on the work of Kling and Scacchi, and the research of others who have followed their approach. In 1979 Kling and Scacchi observed that "many of the difficulties users face in exploiting computer-based systems lie in the way in which the technology is embedded in a complex of social relationships" (Kling & Scacchi, 1979, p. 6). They developed this theme further in a later paper (Kling & Scacchi, 1982). Here they concluded that much research about new computing developments ignored the social contexts in which the technology was developed and used, as well as the history of the organisations in which these developments were situated. They also noted that researchers did not question that those involved in such developments – whether as developers or users – acted in a rational manner, as opposed to working according to specific, personal, short-term agendas (Kling & Scacchi,

1982, p. 2). Added to this, infrastructural support was assumed, or simply treated as an adjunct of the main research topics. There was no acknowledgement that infrastructural resources may be inadequate, take time to develop to the required standard, be difficult to access and manage, and command social and political power. For these reasons, it was argued, it was often not until the post-implementation stage that organisations realised the degree of infrastructural support required for new technical developments (p. 19). This is not to say that Kling and Scacchi believed that human and organisational factors were ignored in information systems research. Rather, they were criticising the way that these were treated as a set of organisational issues considered separate from technical problems (p. 7). These inadequacies of the “traditional” approach, labelled as the “discrete-entity” model (p. 2), and deliberately used as a foil for Kling and Scacchi’s own approach explained in the 1982 paper (p. 70), were manifest in studies that observed a failure of technology developments to meet expectations (p. 3). Predictions of future “success” of implementations were observed to be over-optimistic, as were the projected time-scales and costs, due to the analytical simplicity of the discrete-entity model. This was because “programs for planned social change which are narrowly conceived often fall short of their announced goals” (p. 72). In addition, Kling and Scacchi argued that researchers had been distracted into investigating only the manifest aspects of implementations. They thus failed to identify (often more important) social and political factors (p. 10). As an alternative to these flawed approaches to making sense of technical innovation Kling and Scacchi’s proposed new strategies. They labelled these as “web models”. Web models are ideal types based on an analysis of publications on technology developments. They make several assumptions about computer systems:

- they comprise more than neutral technical components;
- they are a form of social organisation;
- they are subject to limitations of available resources (for example, financial investment, political power, staffing) for which they have to compete (for example, with other computer systems);
- the formal articulation of their features is inadequate as a guide to what a computer system can do, or how it will be used (p. 8).

Kling and Scacchi (1982) argued that the deployment of web models make “better predictions of the outcomes of using socially complex computing developments” and make “explicit the salient connections between a focal technology and its social and political contexts” (p. 3). They suggested that planners who adopt the web model approach would view technical change as embedded within numerous other activities, and recognise that the outcomes of the technical change are subject to the actions of those involved in it, as well as the history of related changes within the organisation. Work on technical developments would lead to an understanding that it is not enough to simply deal with equipment: complex institutional negotiations are also required (p. 4).

The 1982 paper is of particular interest to this research for two reasons. The first is related to the set of findings it presents from case studies on the implementation of technical innovations.

Much of the discussion of general issues pertinent to the introduction of new technology in organisations articulates with the findings from the knowledge-sharing literature reviewed above. For this reason, the main propositions of Kling and Scacchi's 1982 paper are discussed below with reference to the material already presented in this chapter on knowledge sharing and the role of the intranet in such activity. There are five main propositions of the 1982 paper.

1. *Computer-based service provision is specialised* (pp. 26-29). This proposition is in line with the conclusion of the literature on knowledge sharing that such practice is local (see page 17 above).
2. *History of commitments constrains choices* (pp. 29-30). Any new system is thus both supported and compromised by previous decisions on systems implementation. This proposition is supported in the findings of the literature with reference to respect for legacy systems (see page 20 above).
3. *Narrow incentives and opportunities motivate choices* (pp. 30-31). For example, in one of the cases described in their article, Kling and Scacchi showed how the conflicting agendas of two sets of staff meant that the system was handled in two different ways. Those involved in marketing needed it to accommodate new services delivery, technical staff saw it as a platform on which to develop new skills, and both groups had to negotiate a means of meeting their objectives simultaneously (p. 59). This matches with what the literature says about explicit reward systems, knowledge sharing and opportunistic behaviour (see page 7 above).
4. *Macrostructural patterns influence local computing, i.e. it is context dependent* (pp. 32-36). This is illustrated in two case studies where demands of the external labour market determined individuals' willingness to invest their time in learning about, and developing, technical implementations in their own companies. It is concluded that "if participants see few or no... opportunities {for professional advancement}, then innovation, as well as the ease with which local computing systems will be used and kept operational, will decline, and the systems will become less well understood, more demanding to use, and more costly to sustain" (p. 61). Less obvious is the impact of the network of actors who contribute to on-going support of a computer system, such as service organisations, vendors, knowledgeable colleagues who can help the less competent (p. 64). The findings of the literature on ICTs and knowledge sharing articulates with this proposition with respect to ease of use (see page 19 above) and the generation of critical mass (see page 22 above).
5. *Computing systems evolve through fitting and packaging* (pp. 36-38). The ad hoc way in which computer systems develop means that they rarely present themselves as coherent entities. Rather, it is possible to see how they have been adapted to local circumstances according to existing social and technical configurations. They may be used in an unexpected manner; they may not even be used at all: "whether the innovations reinforce or subvert is determined by the distribution and configuration of system resources, by those actors participating in the development of the innovation, by the participants who use and evolve them, and by the conditions existing when they were packaged" (p. 38). Kling and Scacchi's comments on local fit of a technical innovation tie neatly with the knowledge

management literature on the need for systems to articulate well with communities (see page 20 above.)

Added to these five main propositions are seven others (pp. 39-40).

6. Adoption is selective. This has been shown to be the case in the actual use of technologies and unintended outcomes of the deployment of ICTs for knowledge sharing, as outlined on above on pages 17-23.
7. Innovation is continuous rather than discrete.
8. Costs are often underestimated and payoffs overestimated. This has been seen in the case of intranet implementations, as highlighted on page 23 above.
9. Different technical arrangements reflect political and social value choices as well as 'technical rationality'.
10. Weak infrastructure often impoverishes the quality of computer-based services and systems actually provided.
11. The infrastructure of computing services is often unevenly developed in organisations. The quality of infrastructure will also vary across organisations, across applications within an organisation, and across modes of computer use.
12. Outcomes of computer use and strategies for computing management are context-sensitive.

Further observations from case studies examined in the 1982 paper indicate that:

- computer systems are dynamic, rather than fixed, entities;
- individuals' career aspirations help determine the distribution of computing resources and system configurations;
- whether or not individuals are productive users of a system depends on their access to the resources it holds;
- the level of access also determines the type of interaction that they might have with the system (in terms of its complexity);
- changes to a computing environment may increase or decrease its complexity, depending on how they are packaged and fitted;
- individuals are prepared to negotiate resources in order to have a suitable computing environment;
- the results of such negotiations affect how the computing infrastructure develops, can be managed, the costs and benefits of the innovation in a complex organisation and how these are distributed amongst its members (p. 65).

The second main reason why the 1982 work of Kling and Scacchi is attractive in the context of this research is that it provides a loose framework for handling primary data in investigations that consider how computer-based applications are integrated into organisational activities.

When using a web model the researchers focus on the question "What kinds of things do people do here". They are "concerned with the array of activities that people actually engage in while pursuing some task" (p. 9). This is important because "If one wants to predict how people will integrate computer-based systems into their organizational activities, it helps to know what

people actually do and care about most when they act in organizations” (p. 17). The environment in which employees act is also taken into consideration in the examination of the organisation's going concerns. When this is understood it is possible to see the elements of the organisational context on to which new technical implementations are grafted (p. 18).

There are four conceptual elements to web models. They are valuable because they can be deployed to describe and explain how a computerised implementation has developed by focussing on critical social and technical relationships (p. 22). The first of these elements is *lines of work and going concerns*. “Line of work” refers to what people do in the course of their work (as opposed to what is articulated on their formal job descriptions) (p. 17). The term “going concerns” indicates the mesh of activities, some of which are in conflict with one another, conducted to support lines of action in an organisation (p. 17). The second element is the *infrastructure* of a computer-based system or service. In a sociotechnical analysis this term indicates resources that contribute to the support of product or service delivery (p. 18). These could be inanimate objects such as documents, for example training manuals, or people, for example subject experts (p. 77). Infrastructure is important because “{f}or organizations with limited resources, the ability to provide adequate infrastructure, rather than the ability to purchase new equipment, may be the element which most influences the organizational value of computing technologies” (p. 20). *Production lattices*, the third concept of the web model, refers to the different elements that contribute to the production of a product or service. These elements are provided by diverse groups located in different settings across the organisation. A production lattice is constituted by linked individuals who depend on others in the chain in order to make their contribution to the final product or service (pp. 20-21), as well as the consumers of the product or service (p. 69). An examination of a production lattice treats it as “an essential element of ‘the computer system’” (p. 21) as the stages in the creation of computerised resources are identified (p. 23). Production lattices are dependent on local infrastructure (p. 69), and when production lattices are spread across several departments and/or involve staff in a number of roles or with differing specialities, technologies are more likely to be compromised (p. 70). The final concept of the web model is the *macrostructures of the computing environment* (p. 16). Macrostructures are external factors that impact the work of those who concerned with the deployment of computer implementation. They are constraints which may derive from within the organisation, for example from another department, or from outside (p. 21). Production lattices are embedded within macrostructures (p. 69). When treated together, the four elements allow researchers to “view computing developments as complex social objects constrained by their context, infrastructure, and history” (p. 69).

The propositions, observations and the four conceptual elements of web models as advocated by Kling and Scacchi in 1982 do not represent a “theory” in the traditional sense (for example, they cannot be used for hypothesis testing) but they have been validated over the years. A number of significant studies on knowledge management and systems implementation serve as precedents for using the web model for a sociotechnical analysis (for example: Lamb & Kling, 2002; Lamb, King, & Kling, 2003; Kling, 2003; Kling, McKim, & King, 2003; Sawyer, 2000;

Sawyer et al., 2000; Sawyer & Southwick, 2002; Sawyer, Allen, & Lee, 2003). One of the main reasons why these researchers have adopted Kling and Scacchi's approach is the web model's empirical fidelity: "it is organized to better match the social relations which influence the development and use of computerized technologies in complex organizations" (Kling & Scacchi, 1982, p. 10). Its attention to the constraints of infrastructures and macrostructures provides the opportunity to evaluate the under-performance of a systems implementation. This is in contrast to discrete-entity models which predict the degree of implementation "success" under the best of circumstances: web models indicate what is *likely* (Kling & Scacchi, 1982, p. 40). They have also found the approach attractive because the web model facilitates the analysis of complex computer-based systems that are developed, operated and used by several organisational constituencies (Kling & Scacchi, 1982, p. 69). It allows researchers to discuss "the "social, economic, and political relationships between people and groups in organizations {that} have an important influence on the design, development, and uses of computerized systems" and concerns about "acceptance, status, resources, power, and meaning" in these relationships (Kling & Allen, 1996, p. 269). The sociotechnical approach fits the research undertaken on the role of the intranet in knowledge sharing for similar reasons. Of particular interest is its suitability for exploring the local view, thus aligning the work undertaken with previous studies on knowledge sharing (see page 17 above). It also permits more detailed study of the negative outcomes of intranet implementations (see page 23 above), thus building on previous studies that consider systems implementation difficulties from a sociotechnical perspective (for example, Fleck & Howells, 2001; Williams, 1997). From a broader perspective it provides a framework for developing reports of what is found in a case study environment from "stories" of an implementation into a detailed assessment of the social context in which contradictions arise.

2.7 Themes and methods derived from the sociotechnical approach relevant to the research

The adoption of a sociotechnical approach opens up a number of themes and methods for the research. The first of these is the status of people and technologies as socially-embedded agents that interact in organisational contexts. Recent work by Lamb and Kling (2002) argues strongly for such an approach. The goal of their 2002 paper is to persuade researchers to pay heed to the social context of ICT adoption and deployment (Lamb & Kling, 2002, para 91) by considering "the user" as a social actor whose "everyday interactions are infused with ICT use" (para 2). Social actors, they maintain, are "selectors of information for embedded interorganizational communications, and... active facilitators of changing information infrastructures. They are ICT 'designers-in-use', who take advantage of opportunities to modify work roles and develop new information practices; and they are ICT-use proliferators who spread information practices with and across organizations" (para 92). In recognising the role of social actor Lamb and Kling reject the "traditional" view of "the user" (para 78).

Lamb and Kling (2002) have attempted to synthesise their ideas on the social actor into a guiding research and design model that characterises ICT-relation actions according to four dimensions.. The value of their model is that it encourages investigations to be directed into the

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interactions between agency, ICTs and structure within organisational settings (para 78). Lamb and Kling invite the information systems community to test their reconceptualisation of the user as social actor in their studies by examining ICT use of groups and individuals in organisations (para 92), and the network of relationships in which they exchange information (para 38). In doing so, they argue, over-optimistic predictions of ICT will be less frequent because the focus will be on the whole network involved in the implementation, rather than on inflated individualistic aspects of technology use that do not scale up to the group and organisational level (paras 3-4, 10). This approach matches with the perceptions of workers who do not regard themselves primarily as end-users of systems, but as professionals who earn their salaries through the completion of particular tasks, rather than as a reward for using computers (para 14).

Some of the general findings of the primary research that led to the development of Lamb and Kling's multi-dimensional social actor view relate to specific details outlined in review of the literature on knowledge sharing and intranets. For example, the work on affiliations shows that since individuals belong to multiple, and sometimes overlapping, networks in the work environment, shared perceptions of appropriate technology use differ (Lamb & Kling, 2002, para 64). Similarly, the findings on interactions highlight that social actors work in environments that present conflicting and ambiguous requirements and so adapt their ways to working to accommodate this (Lamb & Kling, 2002, para 77). This indicates that local environments are significant to actual technology use, as is the case with knowledge-sharing practice (see page 17 above). Equally Lamb and Kling's contention that social actors operate in the interests of their organisation, their sub-unit or themselves when using ICTs to facilitate exchanges and service affiliations (para 65) articulates with discussions of rewarding knowledge sharing (see page 6 above).

Lamb and Kling (2002) advocate the deployment of actor-network theory as a means of providing further explanations of social actor dimensions and characteristics in future research (para 84). The role of actor-network theory in the study of technologies has been recognised elsewhere by sociotechnical analysts (for example, Fleck & Howells, 2001; Law, 2000; Williams, 2000). It has also been identified by organisational theorists with interests in organisational learning (and thus, by implication, knowledge sharing) as a means of understanding how new insights are garnered by individuals who operate in communities of practice (Fox, 2000, p. 853). Here the assumption is made that "COPT {community of practice theory} is chiefly a social theory of learning, where 'social' stands for relations amongst individual people within COPs" (Fox, 2000, p. 860). Thus actor-network theory is the second of the important themes and methods that the sociotechnical approach opens up for this research, as noted on page 28 above. Actor-network theory is discussed in further detail in Chapter 3 in the context of the methods chosen for the collection and analysis of primary data in the case study organisation for this research.

The third major concept of the sociotechnical approach that is important in the context of knowledge sharing and intranets is the "boundary object". The concept of the boundary object

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relates to the enhanced status of technologies as “social objects which may be highly charged with meaning” (Kling & Scacchi, 1982, p. 8) in implementation networks. Star and Griesemer developed the concept of boundary objects as artefacts that permit the co-ordination of distributed work by different organisational groups. Although the groups may be distinct from the others in many aspects (such as their goals, culture, work-place language or working methods), the identity of the boundary object is common to all the groups that use it. The boundary object recognises the unique identity of each group whilst highlighting important points of reference between them, simultaneously acting as anchors and bridges (Star & Griesemer, 1989, p. 414). The boundary object takes four forms (Star & Griesemer, 1989, p. 387 and p. 410-411):

- (1) repositories, for example a library;
- (2) ideal types, for example a map or species term;
- (3) coincident boundaries, i.e. objects that have the same “shape” or physical form, but whose contents are different for each set of users, for example maps for different purposes;
- (4) standardised forms, i.e. “methods of communication across dispersed work groups” (Star & Griesemer, 1989, p. 411).

A boundary object may be an abstract entity, such as a list (Star & Griesemer, 1989, p. 406), or concrete, such as a physical model that serves as a tangible surrogate for the more complex “reality” (Arias & Fischer, 2000). Depending on the perspectives of the constituencies that interact with a boundary object it can simultaneously be both concrete and abstract (Star & Griesemer, 1989, p. 408). One case study describes as “action space” the physical artefact of a horizontal electronic whiteboard set with moveable objects to represent houses, cars, street furniture etc., for urban planning. A second electronic white board on the wall is used as “reflection space”. Here the first white board is a physical boundary object and the “contents” of the second board an abstract boundary object (Arias & Fischer, 2000).

Boundary objects serve multiple purposes in collaborative work. First, they provide a means of connecting groups and stabilising their relationships. A boundary object is likened to a blackboard in that it sits in the middle of people with different viewpoints (Albrechtsen & Jacob, 1998, p. 298). It can offer a brokering or negotiating role through the co-ordination, alignment or translation of the perspectives of the different groups that it serves. As these perspectives are shared, common understandings are made known and the communication of established ideas and knowledge is facilitated. From this base the boundary object supports further debate and discussion, where participants can critique the contributions made. Thus the boundary object provides the opportunity for knowledge creation through the processes of creative abrasion (Leonard & Straus, 1998). This may be achieved as a result of consensus or intense conflict: “Creating and reshaping boundary objects is an exercise of power that can be collaborative or unilateral” (Boland & Tenkasi, 1995, p. 362). A resulting “dynamic tension” provides the impetus for the development of new ideas, practices and products (Robinson, 2000, para 2). Boundary objects are therefore useful in prompting knowledge sharing and providing opportunities for knowledge creation, but are not unproblematic due to the potential for discord between the parties that operate with them.

Added to the category of boundary objects are “boundary spaces” and “boundary people”. These concepts have been discussed in a range of domains from sociology (for example, Aldrich & Herker, 1977) to the history of science (for example, Galison; 1997; Hong, 1999). Boundary spaces may be physical, for example a laboratory, or intellectual, for example a conference. Galison (1997) labels these spaces “Trading Zones”. He shows how they make communication possible by intersecting different worlds and mediating different interests (Galison, 1997). In the context of communities of practice, there are a number of knowledge broker roles. These include that of the “boundary spanner” who takes care of a specific boundary of a knowledge community, the “roamer” who goes from place to place, creating an informal web of connections and the “outpost” who travels afar and returns to the group with news from new territories. Boundary people have interdisciplinary interests and are comfortable crossing between knowledge systems of different domains. They are skilled in mediating the knowledge flows across the boundaries (Huysman & De Wit, 2002, p. 170). Their position and influence continuously redefines boundaries between groups (Hong, 1999, p. 300).

The employment of boundary objects can stimulate knowledge sharing by encouraging communication and collaboration between groups. In providing a locus for common points of reference it is argued that “{t}hought worlds with different funds of knowledge and systems of meaning cannot easily share ideas, and may view one another’s central issues as esoteric, if not meaningless” (Boland & Tenkasi, 1995, p. 351) may meet with a lowered potential for misunderstanding or conflict (Star & Griesemer, 1989, p. 413). When employed successfully no single group monopolises the “joint vision” at the point of reference. All are aware that the weak structure for common use still permits adaptation into something stronger for the specialist community use (Albrechtsen & Jacob, 1998, p. 301; Star & Griesemer, 1989, p. 393). Thus when operating with the boundary object, groups negotiate levels of power and status with the expectation of building community-type links, and meeting actors from multiple disciplines to permit the exploitation of weak ties.

Boundary objects are particularly important to encouraging knowledge sharing between experienced team members and new colleagues. Continued interaction and collaborative work based on prior experience of joint learning generate new boundaries (Arias & Fischer, 2000, p. 2). Experienced and active participants are advantaged in their access to information and knowledge due their on-going immersion in the shared projects whether or not boundary objects have been generated. However, for non-participants and new recruits the provision of a boundary object can make a difference in their efforts to understand the concepts that are novel to them. Boland and Tenkasi (1995) have also identified how boundary objects help experienced members of staff identify requirements for knowledge sharing. They refer to a product development project that failed because individuals neglected to depict and exchange representations of their *unique* knowledge, working on the assumption that the knowledge base of each team member was identical (Boland & Tenkasi, 1995, p. 358). This finding revealed that it is not just sharing knowledge between colleagues, but that sharing *meta*-knowledge of colleagues’ knowledge that is important (as has already been identified in the context of

providing knowledge-sharing systems that articulate with communities on page 20 above). They explain that “{m}aking explicit representations of one’s knowledge and understandings to exchange with others enables one to better appreciate the distinct ways of knowing that those others will attempt to communicate” (Boland & Tenkasi, 1995, p. 359).

This discussion of boundary infrastructure (i.e. objects, spaces and people) in the context of a sociotechnical analysis points to possible roles for the intranet in knowledge sharing. As a repository of codified information for “public” corporate use by multiple constituencies it fits with the first boundary object form listed on page 30 above. Equally form number 4 might be appropriate, where an intranet provides shared working space.

The fourth important theme opened up by the adoption of the sociotechnical approach for this research is power relations. The links between knowledge management, knowledge sharing and power relations are explained by Ekbia and Kling (2003):

Knowledge management... {entails} managing the ways that a firm’s employees will share social knowledge, or knowledge whose revelation can have important social consequences for those who believe it... power relations are closely involved in the management of knowledge... they are constitutive elements of the processes and mechanisms that determine which knowledge is shared with whom and in what ways. What kinds of knowledge can be shared is determined by power relations.

(Ekbia & Kling, 2003, para 20.)

The nature of power relations is of particular interest to managers and researchers in understanding knowledge-sharing practice (Ekbia & Kling, 2003, para 8) since analysis of power and conflict can serve as an explanatory factor of the gap between high expectations of ICTs and low organisational usage (Schultze & Leidner, 2002, p. 231). Although power relations have been addressed in some empirical knowledge management research that takes a sociotechnical approach (for example, Pan & Scarbrough (1999) refer to the political dimensions of leadership, including how managerial incentives can be used to counter non-compliance with knowledge-sharing requests) they have not been integrated into theories of knowledge management (Ekbia & Kling, 2003, para 3). Instead, they appear to be hidden under the label of “culture” as an explanatory factor of knowledge-sharing success or failure. Ekbia and Kling (2003) contest the broad explanation of “culture” as the reason why knowledge-sharing initiatives fail in organisations. They maintain that the “language of ‘culture’, it seems, is one that enables analysts to allude to issues of power without discussing specific power relationships” (para 49). In two reported case studies that they examine, for example, they look beyond the superficial explanations for difficulties experienced between departments and conclude that “department heads refused to share their knowledge and know-how with other department{s} because they did not want to instigate a reduction in their budget and power with their own hands” (para 49). Those who engage in sociotechnical analyses of knowledge sharing are urged to examine the issue of “culture” at this deeper level. In doing so they may make sense of how “power relationships can systematically influence the statements about the social world that function as true” (Ekbia & Kling, 2003, para 1). Thus such an approach helps explain how

falsehoods of an implementation are generated into “regimes of truth”, with reference to power relations within organisations.

Although the notion of power relations has received limited attention in sociotechnical studies in information science, there is some evidence of attempts by organisational theorists to tie this theme to other concepts already discussed in this chapter (for example, Andrews & Delahaye, 2000; Blackler & McDonald, 2000; Coopey & Bourgoyne, 2000; Easterby-Smith et al, 2000; Fox, 2000). Fox (2000), for instance, concentrates on power relations in arguing that community of practice theory (COPT) and actor-network theory “can enrich each other and together make a stronger contribution to our understanding of organisational learning” (p. 853). He recognises that earlier work on communities of practice has failed to explain the role of power in the learning process (p. 857). This is in spite of its influence being easily identifiable. For example individuals within communities of practice exert power in disputes over shared meanings, especially across generations of membership (p. 856). Equally, relationships between members of a given community are unbalanced given that some individuals have belonged to it for a longer period of time than others (pp. 856-857). Fox (2000) addresses the issue of power by referring to the work of Foucault. His goal is to demonstrate that by extracting ideas from Foucault and actor-network theory, it is possible to enhance COPT (p. 857). This strategy is justified with reference to work collected by Law (1986), in which three actor-network papers are highlighted as “essays on the techniques of power/knowledge and most owe more than a little to the writing of Foucault” (p. 18). Foucault’s approach (as articulated by Fox, 2000, p. 859) examines power relations in the context of actors’ activities and interactions (p. 858) in local environments (p. 859), where it is an “active, resistive or reactive force”. It is worth noting that this attention to activity, relationships and context articulates with the goals of Kling and Scacchi’s (1982) web model as described above.

2.8 Conclusion to Chapter 2

The findings from this review reveal a lack of significant extant literature on the specifics of the topic of investigation for this research. Indeed, when considered together, it is clear that results of previous studies on the role of ICTs in knowledge sharing are inconclusive in that they cannot be regarded as robust or complete, and are often contradictory. Added to this, to date, no significant work has considered the role of the intranet in knowledge sharing in large, distributed partnership organisations such as KPMG. It is perhaps unsurprising then, that it is not possible to draw an appropriate theoretical framework for this research from the literature that considers ICTs and knowledge sharing as its main focus. For this reason, direction for the primary research discussed in this thesis is extracted from the broader base of the studies by Kling and his collaborators, or those who have followed Kling’s lead, in the domain of sociotechnical research. This work, particularly the 1982 paper co-authored by Kling and Scacchi, provides a loose thematic framework for the research. The adoption of the sociotechnical approach also has the advantage of opening up other themes that can be related to knowledge sharing and intranets. These include the role of users and technologies as social actors (pages 28-29), boundary infrastructure (pages 29-32) and power relations (pages 32-32). In addition,

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sociotechnical analyses provide precedents for the handling primary data. Of particular interest to this work is actor-network theory, introduced on page 29 above. This is considered in further detail in the next chapter as the part of the discussion of methods for the research.