

**Exploration and Exploitation:  
Toward a Theory of Knowledge Sharing in  
Digital Government Projects**

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*To my parents,  
Helga and Erwin Scharf*

*and in loving memory  
of my grandfathers,  
Erich Scharf and Hermann Suckow*



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<sup>2</sup> Unless otherwise indicated, the source of the figures is the author of the present study.



## **Abstract**

This study examines knowledge sharing processes in digital government projects (DGPs). Knowledge sharing processes are a central feature of the functioning of government, but, with very few exceptions, they have received little attention in the literature. The importance of knowledge sharing has become even more evident with the rise of digital government initiatives, as these have a networking effect on bureaucracies, by bringing together individuals from different organizational units, with different skill sets, and different mental models, to work on a common goal – the implementation of the project. With multiple agencies and multidisciplinary knowledge coming together, it is necessary to combine and reconnect the required knowledge. Based on empirical data from four DGPs in two different countries, Switzerland and the United States of America, a theoretical model for knowledge sharing in DGPs is proposed. The model ties together processes and content of knowledge sharing through two task dimensions, each of them subdivided into two phases: (1) Conception and implementation of the project, and (2) Exploration and exploitation of knowledge. I show that the implementation of DG requires a balanced mix of exploration and exploitation of knowledge, where exploration is more important in the conceptual phase, and exploitation becomes more fruitful in the implementation phase. I found that different configurations of knowledge networks in DGPs are related to different stages in the advancement of the project: DGPs rely on sparse networks during the conceptual phase of the project, and tend to employ teams or tightly-bound groups when the project moves towards implementation. The study concludes with implications for research and practice, and gives recommendations for future research.







# 1. Introduction

Das wirklich Harte an Reformen ist das Weiche.

(The really hard part of reforms is the soft part.)

- *Moritz Leuenberger, Swiss Federal Councillor*

The technology is not the challenge. That's really pretty easy. It's the people, and it's the policy... People are going to have to undergo a fundamental change, a total change in the way that they think about their jobs and deliver service, to make this work.

- *A manager of DGP 4*

The possibilities the Internet affords have grown to be ever more important for government agencies in recent years. With tasks continuously growing in complexity and with more decentralized structures, Internet-related technologies have become a necessity for government agencies to function successfully. In addition, the managerial mindset created by public sector reforms such as the National Performance Review (NPR) in the United States (Osborne & Gaebler 1992; National Performance Review 1993) or the New Public Management (NPM) in Europe (Barzelay 1992, 2001; Schedler 1995) demanded that citizens' interests be at the core of public administration's attention, advocating a customer orientation comparable to the private sector. Together with the information society as a driving force, this has led politicians and government officials the world over to make large investments in new information and communication technologies (ICT) in order to provide public services online.

Generally, the introduction of these new technologies takes place in the form of a specific project (referred to as a “digital government project” in this study). These project groups may assume any form between the two extremes of a tightly-knit work team with clear boundaries, whose members were recruited specifically for the project, to a loosely-bound group of individuals spread across various agencies, who participate in the project on a voluntary basis. The success of a digital government project (DGP) depends upon a mix of external and internal factors. In terms of factors external to an agency, political endorsement and constituent satisfaction are especially important, whereas significant internal factors are the government officials’ ability to manage innovation, and knowledge sharing within the agencies. This study focuses on the last, examining how knowledge is shared in DGPs: how do public managers decide what to include and what to exclude in a project? How do they attribute priorities to various activities? What sources inform these decisions? How is their communication network structured?

## **1.1 Significance of the study: The importance of knowledge**

The rising importance of knowledge has been used to characterize post-industrialist societies (Habermas 1971, 1979; Bell 1973; Drucker 1993). Knowledge, it is argued, is a principal economic resource. Unlike traditional factors of production (such as land or equipment) to which knowledge is often compared, knowledge resides within individuals, making it an intangible asset, and therefore difficult to acquire and share. In post-industrialist societies in general and in government agencies in particular, knowledge acquisition and sharing is one of the most important social processes.

Knowledge sharing processes are a central feature of the functioning of government. The relevance of knowledge in bureaucracies has been

acknowledged since Max Weber ([1921]1968), and recently an attempt has been made to translate Weber's theories of knowledge to modern public management (Menne-Haritz 2001). However, with very few exceptions (cf. Blau 1963), the processes of knowledge sharing in government agencies have received surprisingly little attention in the literature. The importance of knowledge sharing has become even more evident with the rise of digital government (DG) initiatives, as these have a networking effect on bureaucracies. The fact that individuals with differing skill sets and from different organizational units work on a common task creates a network that coexists with the functional subdivision of tasks within the organization. Common tasks by their nature require knowledge sharing in order to be fulfilled successfully. With multiple agencies and multidisciplinary knowledge coming together, it is necessary to combine and reconnect the required knowledge.

Knowledge sharing in the public sector meets some specific challenges, such as budget restrictions; data privacy and confidentiality, and related security issues, which, due to mandatory regulations, are a top priority for government; as well as a traditionally rigid hierarchical structure, which render the transition of bureaucracies toward networks difficult (Bardach 1999; Fountain 1999; Agranoff & McGuire 2001; Lazer 2002).

## **1.2 The “digital government” phenomenon**

Digital government refers to the potential to deliver public services online in a customer-oriented fashion. Digital government initiatives comprise a wide range of ICT-enabled applications which require a new way of thinking about government processes in order to achieve efficiency gains by taking advantage of the possibilities that new technologies offer.

Whereas the term “digital government”, or e-government, was diffused to the general public with a special report of the Economist in June 2000 (Economist 2000), research on ICT-induced changes in government goes back a long way (Reinermann, Fiedler, Grimmer, Lenk, & Traunmüller 1988; Gupta, Dirsmith, & Fogarty 1994; Adler & Borys 1996; Lenk 1997; Tsagarousianou, Tambini, & Bryan 1998). Clearly, the Internet denotes a tipping point in history, and government has played an important role in shaping it. But what is truly fascinating is the challenge that this universal phenomenon represents to governments as they try to meet the needs of citizens in an information age not by simply automating existing processes, but by innovating and redesigning processes (Lenk 1997; Bellamy & Taylor 1998) and, even more radically, by completely transforming institutions (Fountain 2001).

### **1.3 Paving the way: Public sector reforms**

It can be argued that public sector reforms laid the groundwork for DG initiatives (Schedler & Scharf 2001), emphasizing the importance of efficiency gains, attempting to introduce market-like principles into government, most visibly expressed in a shift from input to output orientation as well as an orientation toward the customers of government (Barzelay 1992; Osborne & Gaebler 1992; Schedler 1995). There is, however, at least one important difference between the driving forces of these reforms and DG initiatives: whereas public sector reforms are strategy-driven and originate chiefly within government, DG is driven more by outside pressures such as the information society (Fountain & Osorio-Urzuá 2001; Schedler & Summermatter 2002).

The DGPs examined in this study are located in two different countries: Switzerland and the United States of America. Both countries

experienced public sector reforms in the 1990's, and although similar policy concepts have been employed, it should be borne in mind that they carry different operational and institutional meanings in European and American settings (Toonen & Raadschelders 1997). The nature and content of American managerial reforms in the context of the Clinton-Gore Reinventing Government program (National Performance Review 1993) differ from the Swiss version of New Public Management (NPM) in that Swiss reforms are characterized by stronger political control processes (the general basis for state action in Switzerland is a specialized public law), and the emphasis lies on outcomes rather than outputs (Schedler 1995, 1998).

The 'Reinventing Government' campaign of the Clinton-Gore Administration emphasized a businesslike manner of public administration. This is consonant with the long-term 'Science of Administration Approach' to government and public administration repeatedly favored by many in the USA (Gulick & Urwick 1937). According to Toonen & Raadschelders (1997), the current attention for a businesslike approach to government and administration fits well in at least an academic tradition that has previously witnessed a 'Science of Administration' inspired by Taylor's ([1911]1967) famous principles of Scientific Management in the 1930's and an 'Administrative Sciences' movement deriving from organization theory, business administration and management science in the 1950's, 1960's and 1970's (Henry 1975). As Toonen & Raadschelders (1997) stated, "reinventing government in the USA fits into a tradition and, taking one thing with another, comes down to rediscovering classical American Public Administration," (Toonen & Raadschelders 1997:45); as is repeatedly asserted in a special issue of the *Public Administration Review* on Reinventing Government (Carroll 1996). In his book *Reinventing Government in the Information Age*, Richard Heeks (1999) echoed the original book by Osborne & Gaebler (1992), attempting to include the use of IT into their claims for a managerial government by showing through a

variety of international case studies how IT really enabled public sector reform.

One characteristic the US American and European interpretations of public sector reforms seem to have in common is their focus on explicit information transactions along formal reporting structures rather than on informal knowledge sharing within and across governments. Only recently public management scholars have begun to acknowledge the importance of the latter, which Agranoff & McGuire call “management’s hidden dimensions” (1999), stating that nonroutine “[i]nformation transactions are the lifelines between governments as parties attempt to make programs work,” (Agranoff & McGuire 1999:357). Similarly, Lynn (1996) calls for network theory to complement traditional theories of intra- and interorganizational relationships. The present study’s endeavor is to strengthen and reinforce these claims by examining the structure and content of knowledge networks that exist within and across agencies and are directed at implementing innovation projects. The projects examined in this dissertation represent a good domain to study networked government since DGPs by their nature require that organizational boundaries be crossed, bringing together multiple actors with multidisciplinary knowledge, which needs to be pooled in order to successfully fulfill the project objectives.

#### **1.4 Conceptualizing knowledge in organizations**

As the concept of knowledge is so central to this dissertation, this section summarily reviews the main conceptualizations of knowledge in organizations. Research on knowledge in organizations extends over multiple disciplines, and has been reviewed, among others, by Blackler (1995), Spender & Grant (1996), Nonaka & Takeuchi (1995), and Collins (1993). Although knowledge has been defined and characterized in a large variety of

ways, the debate over what knowledge is remains fairly heterogeneous<sup>3</sup>. In a special issue on knowledge in organizations of the *Strategic Management Journal* (Spender & Grant 1996), Grant affirms that "...this debate has intrigued the world's greatest thinkers from Plato to Popper without the emergence of a clear consensus," (Grant 1996:110). For the purpose of this study, knowledge is defined as a justified "true belief" (Russell 1948).

Of major importance to this study is the taxonomy of tacit and explicit knowledge, frequently employed in the literature. Polanyi (1966) asserted that individuals know more than they can explain; i.e. individuals have knowledge that is non-verbalized, intuitive, and unarticulated. Tacit knowledge has been defined as hard to communicate, deeply rooted in action, involvement and commitment within a specific context (Polanyi 1962); "a continuous activity of knowing" (Nonaka 1994:16); or, more practically, as "the way things are done around here" (Spender 1996). Explicit knowledge, on the other hand, is knowledge that is verbalized, written, drawn or otherwise articulated. A classical example in bureaucracies is given by "the files" (Weber [1921]1968), today joined by large databases. Polanyi (1962) stated that the tacit dimension of knowledge defines and gives meaning to its complementary explicit dimension, the inarticulable tacit aspect of knowledge only being known by an awareness of it through a sensing of its corresponding explicit complement (Polanyi 1966:10).

A large variety of tacit-explicit knowledge taxonomies and categorization schemes can be found in the literature. For example, Winter (1987) classified knowledge as simple or complex, teachable or not teachable, observable or not observable; Anderson (1983) distinguished between declarative and procedural knowledge; Ryle (1949) famously divided knowing how (knowing how something operates) from knowing that

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<sup>3</sup> For an overview of knowledge-related constructs, see Venzin, von Krogh, & Roos (1998).

(knowing it exists); and recently, Hedlund (1994) defined three aspects of knowledge: Cognitive knowledge in the form of mental constructs and precepts, skills, and knowledge embodied in products, well-defined services or artifacts. Table 1-1 gives an overview of the discussed knowledge taxonomies along the tacit-explicit continuum.

	<b>explicit</b>	<b>tacit</b>
Polanyi (1966)	Knowledge that is verbalized, written, drawn or otherwise articulated	Knowledge that is non-verbalized, intuitive, and unarticulated
Nonaka (1994)	Discrete, captured in records of the past	A continuous activity of knowing
Spender (1996)	Objectified	Collective
Winter (1987)	Simple, teachable, observable	Complex, not teachable, not observable
Anderson (1983)	Declarative	Procedural
Ryle (1949)	Knowing that (knowing something exists)	Knowing how (knowing how something operates)
Hedlund (1994)	Knowledge embodied in products, well-defined services or artifacts	Cognitive knowledge in the form of mental constructs and precepts
Kogut & Zander (1992)	Information	Know-how
Weiss (1998)	Rationalized knowledge (Weber [1921]1968)	Embedded knowledge (Granovetter 1985)

*Table 1-1: Knowledge taxonomies*

As can be seen in the summarizing table, Kogut & Zander (1992) offer a slightly different view, distinguishing between information and know-how:

- *Information* is “knowledge which can be transmitted without loss of integrity once the syntactical rules required for deciphering it are known” (Kogut & Zander 1992:386), i.e. information is knowing what something means.

- *Know-how* is “the accumulated practical skill or expertise that allows one to do something smoothly and efficiently” (Kogut & Zander 1992:386), along the lines of (von Hippel 1988).

Kogut & Zander’s categorizations of knowledge were conceived to support the application of these concepts to organizations (as opposed to individuals, like most other scholars had focused on): “Know-how...is a description of what defines current practices inside a firm. These practices may consist of how to organize factories, set transfer prices, or establish divisional and functional lines of authority and accountability. The knowledge displayed in an organizational chart, as in any blueprint, is limited to providing information on personnel and formal authority. The know-how is the understanding of how to organize a firm along these formal (and informal) lines. It is in the regularity of the structuring of work and of the interactions of employees conforming to explicit and implicit recipes that one finds the contents of the firm’s know-how” (Kogut & Zander 1992:387). The idea that knowledge resides in both individuals and organizations is consistent with other management literature. Examples of research with organization-level knowledge perspective include: Organizational knowledge (Walsh & Ungson 1991; von Krogh, Roos, & Slocum 1994); organizational routines (Cyert & March 1963; Nelson & Winter 1982); organizational cognition (Stubbart 1989; Greve & Taylor 2000); and cognitive strategic groups (Tajfel 1970; Ashforth & Mael 1989; Peteraf & Shanley 1997).

### *The knowledge-based view of the firm*

The knowledge-based view of the firm derives from the resource-based view of the firm and claims that knowledge is the key productive resource of the firm (Grant 1996; Spender 1996; Horem, von Krogh, & Roos 1996; Liebeskind 1996). Starting from transaction cost economics to explain the

existence of firms (Penrose 1959), the knowledge-based view of the firm goes further in saying that "the central competitive dimension of what firms know how to do is to create and transfer knowledge efficiently within an organizational context" (Kogut & Zander 1992: 384). Knowledge is held by individuals, but is also expressed when members cooperate in a social community; i.e., group, organization, or network. As individual knowledge is limited by the individuals' bounded rationality (Simon 1997), a firm's primary function is to integrate and coordinate individual knowledge (Kogut & Zander 1992; Nonaka 1994; Grant & Baden-Fuller 1995; Zander & Kogut 1995; Conner & Prahalad 1996; Grant 1996; Kogut & Zander 1996; Spender 1996; Kusunoki, Nonaka, & Nagata 1998; Nahapiet & Ghoshal 1998).

Grant and Baden-Fuller make the following basic assumptions on the knowledge-based theory of the firm (1995:18):

- Knowledge is the key productive resource of the firm in terms of contribution to value added and strategic significance.
- Knowledge comprises information, technology, know-how, and skills. A critical distinction is between explicit and tacit knowledge (see section 1.4).
- Knowledge is acquired by individuals, and in the case of tacit knowledge is stored by individuals.
- Because of the cognitive and time limitations of human beings, individuals must specialize in their acquisition of knowledge: increased depth of knowledge can normally only be attained through sacrificing breadth of knowledge.
- Production typically requires the application of numerous types of specialized knowledge.

Given the assumptions about the characteristics of knowledge and the view of knowledge as a strategically important resource for the organization (Grant 1996) as well as a principal source of competitive advantage (Nonaka 1994; Spender 1996; Teece, Pisano, & Shuen 1997), it is not surprising that knowledge sharing has received broad attention from the strategic management literature. A detailed review is presented in chapter 2. However, it could be argued that the knowledge-based view of the firm is not an appropriate lens to study government agencies, as the underlying theories are mainly centered on the concept of competitive advantage in private sector firms. In this study, I make a case for the applicability of the knowledge-based view of the firm to government agencies, provided some adjustments are made to the original concept, for example by broadening the scope to “serving the public”, and doing so emphasizing the core objective of modern public sector organizations. Furthermore, as I have described in this chapter, the public sector is experiencing significant changes in its organization and governance structures, leading to issues that are comparable to those in the private sector.

In sum, this study attempts to fill a gap in the research on bureaucracies by examining knowledge networks in government agencies as they face endogenous (public sector reforms) as well as exogenous (Internet) challenges to their traditional processes. The relevance of knowledge in bureaucracies has been acknowledged since Max Weber, but the mechanisms, influences, and outcomes of knowledge sharing have barely been studied. Differently so in the field of strategic management, where the knowledge-based view of the firm has developed since the 1990’s as an approach to understanding the competitive advantage of organizations. I argue that this approach bears significant value for the (less competitive) environment of public sector organizations, in that these are centered on the retrieval, sharing, and dissemination of knowledge, and, with growing

complexity in terms of tasks and structure, a knowledge-based view becomes indispensable for studying them.

As stated above, DGPs by their nature require that organizational boundaries be crossed, bringing together multiple actors with multidisciplinary knowledge, which needs to be pooled in order to successfully fulfill the project objectives. The challenges government decisionmakers face with digital government projects (DGPs) require an understanding of the underlying decisionmaking structure and processes of DGPs. This dissertation seeks to add to the understanding by studying these processes in great detail.

## **1.5 Contributions of the study to theory and practice**

This study follows an interdisciplinary approach, drawing from and analyzing conjointly the fields of public management, organizational theory, sociology, social psychology, and strategic management. It attempts to contribute to these disciplines by proposing a theoretical model for the knowledge sharing in inter- and intraorganizational project groups, building on empirical data from four DGPs. The model ties together processes and content of knowledge sharing by showing that the implementation of DG requires a balanced mix of exploration and exploitation of knowledge, where exploration is more important in the conceptual phase, and exploitation becomes more fruitful in the implementation phase. I found that different configurations of knowledge networks in DGPs are related to different stages in the advancement of the project: DGPs rely on sparse networks during the conceptual phase of the project, and tend to employ teams or tightly-bound groups when the project moves towards implementation.

In addition to the advancement of theory, the present study has practical implications: it gives specific recommendations to public managers on how to conceive and implement a DGP more effectively by understanding and emphasizing the crucial importance of knowledge sharing in inter-agency collaboration.

## **1.6 Organization of the study**

The study is organized as follows: This chapter described the importance of knowledge sharing in DGPs and the key research questions to be addressed in this dissertation.

Chapter two reviews the literature on knowledge sharing, its influencing factors, and the coordination mechanisms of knowledge as a theoretical foundation for studying knowledge sharing processes in DGPs. The review ties together various disciplines, drawing on organizational theory, social psychology, and sociology.

Chapter three discusses the key methodological issues and the data analysis of this thesis, tracing the actual work process of grounded theory from sampling to data analysis. The chapter concludes with limitations and evaluation criteria.

Chapter four presents the findings of the empirical study in terms of the decisionmaking processes, the modes and influencing factors of knowledge sharing, and the coordination mechanisms of knowledge in four DGPs. I show in detail how these projects differ in their stage of advancement, in the functional subdivisions of their actors, and in their organizational form; and how these factors affect the way knowledge is shared in the projects.

In chapter five a theory for knowledge sharing in DGPs is developed. Two main dimensions in terms of tasks are discussed, each of them subdivided into two phases: (1) Conception and implementation, and (2) Exploration and exploitation. I present the developed theory by means of four propositions, and conclude the chapter with a discussion of the theory.

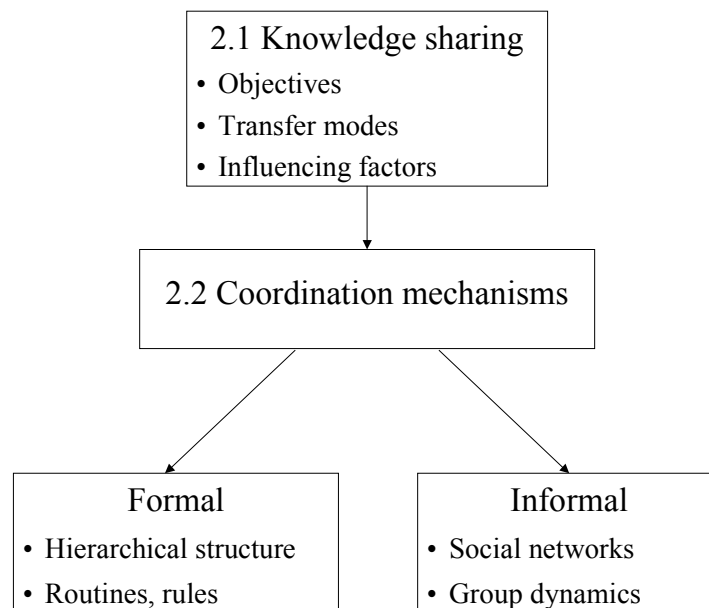
The concluding chapter, chapter six, summarizes the key findings of the study. It points out the implications of this study for research and practice, and provides recommendations for future research.

## 2. Theoretical foundations

In the previous chapter, I have made an argument for the crucial importance of knowledge sharing in digital government projects (DGPs). DGPs bring together individuals from different organizational units, with different skill sets, and different mental models, to work on a common goal – the implementation of the project. The following elements of knowledge sharing are particularly important in this context:

1. *Modes of knowledge sharing.* Knowledge can be imitated, copied, or transferred through communication (Zander & Kogut 1995), each mode yielding different results according to the actors involved – individuals, groups, the organization, and other organizations.
2. *Influencing factors of knowledge sharing.* Experience, trust, motivation, and the difficulty of knowledge transfer significantly influence whether and how effectively knowledge is shared.
3. *Cultural context.* National and organizational culture impact a group's functioning and knowledge sharing, which can in itself represent a cultural subgroup.
4. *Use of information technology.* Although this study is about conceiving and implementing information technology, its use by the group members affects the way knowledge is shared and therefore needs to be included in the discussion.
5. *Coordination mechanisms of knowledge.* Knowledge sharing is different in hierarchies, routines, networks, and groups, mechanisms which coexist in all DGPs of this study.

This chapter describes the theoretical foundations for studying knowledge sharing in DGPs. The first section gives an overview of the objectives, mechanisms, and influencing factors of knowledge sharing in groups and organizations, reviewing key literatures in the fields of strategic management, organizational theory, sociology, and psychology. In the second section, I discuss the impact of formal and informal coordination mechanisms on knowledge sharing. Each section ends with a question which relates the theoretical considerations to the empirical setting, and which I attempt to answer in this study. I conclude by presenting a conceptual framework that ties together the questions raised in this chapter. An outline of the chapter is given in the figure below.



*Figure 2-1: Outline of chapter 2*

## 2.1 Knowledge sharing

Over the past decade, scholars from a variety of disciplines have produced a considerable volume of literature on knowledge sharing.<sup>4</sup> Recent issues of the *Strategic Management Journal* (Spender & Grant 1996) and *Organizational Behavior and Human Decision Processes* (Argote, Ingram, Levine, & Moreland 2000) focused on knowledge sharing in groups and organizations, reflecting the multiplicity of perspectives from which knowledge sharing has been studied.

A predominant perspective on knowledge sharing, mainly addressed in the strategic management literature, is the realization of competitive advantage through effective sharing of knowledge. In the resource-based theory of the firm, the objective of the firm is to establish conditions that permit the realization of sustainable competitive advantage (Grant 1991; Dierickx & Cool 1989; Fiol 1991; Peteraf 1993). The firm's resources are seen as strategic assets, and resource asymmetries between firms can be a source of organizational rent (e.g., Winter 1987; Amit & Schoemaker 1993; Black & Boal 1994). As stated in the introduction to this thesis (cf. chapter 1), the knowledge-based view of the firm is built on the assumption that organizational knowledge is a key strategic resource and therefore argues that an effective creation, storage, and application of knowledge leads to a competitive advantage for the firm.

Another important focus area for organizational researchers has been to understand the modes through which knowledge is transferred. Knowledge

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<sup>4</sup> I differentiate between the terms 'knowledge sharing' (a generic bidirectional flow) and 'knowledge transfer' (a directed flow from A to B). However, the latter term is problematic from an ontological perspective: it suggests that the sender gives up something that the receiver then acquires (Luhmann 1995). This is not the case; on the contrary, knowledge is a resource that multiplies when it is shared effectively (Davenport & Prusak 2000).

resides in people, products and procedures of the organization; and this knowledge can be imitated, copied, or transferred through communication (Zander & Kogut 1995). Imitation of knowledge is difficult because, as Reed & DeFillippi (1990) put it, “there is a fundamental difference between having information and understanding it” (Reed & DeFillippi 1990:94). Szulanski (1996) used von Hippel’s (1994) concept of ‘stickiness’ to explain why knowledge is not shared within an organization, claiming the barriers to imitation to be the recipient’s lack of absorptive capacity (the ability to exploit outside resources of knowledge), and causal ambiguity (the lack of transparency about what the factors of production are and how they interact during production). Whereas it is desirable to reduce barriers to imitation within an organization, imitation across organizations can be harmful to the “imitated” organization among competitors. Strategic management scholars have examined ways of creating barriers to intra-organizational imitation, arguing that competitive advantage becomes sustainable when barriers to imitation are raised (Reed & DeFillippi 1990). Kogut & Zander (1992) found that imitation can be deterred by innovation, if a firm is in the possession of at least one bottleneck capability, such as patent protection or the exercise of monopoly restrictions, and this capability is rewarded in the market. However, the protection of distinctive competencies can make a firm vulnerable to substitution, which can be delayed if the firm makes a credible commitment to stakeholders (McEvily, Das, & McCabe 2000).

Probably the most frequently discussed mode for knowledge sharing is organizational learning. The term was elaborated by Argyris & Schön (1978), although also studied by March & Simon (1958) and Cyert & March (1963). Argyris & Schön defined organizational learning as the ability of an organization to detect and correct error. They developed the concept of single-loop learning to identify the process through which organizations detect and correct error within existing definitions of norms, policies, and objectives. Single-loop or lower-level learning involves the gradual

improvement of organizational practices and routines (Argyris & Schön 1978; Nelson & Winter 1982). Double-loop or higher-level learning is the process through which “error is detected and corrected in ways that involve the modification of an organization’s underlying norms, policies, and objectives,” (Argyris & Schön 1978:3). In other words, double-loop learning involves learning how to learn (Cummings 2002).

At the individual level, learning occurs through education, experience and experimentation. Organizations learn as their “systems and culture retain this knowledge and transfer it from individuals” (Yeung, Ulrich, Nason, & Von Glinow 1999:9). Therefore, organizational learning is a process through which the knowledge held by individuals is amplified, internalized, and externalized as part of an organization’s knowledge base (Nonaka 1994:20). Nonaka used the concept of a spiral of knowledge creation to explain this organizational learning process (see figure below).

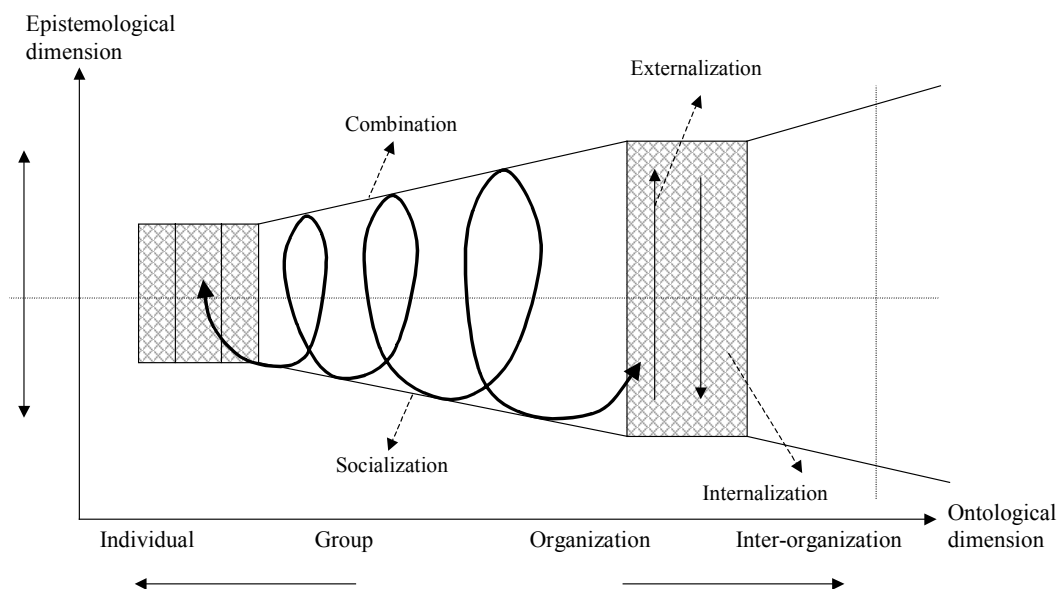


Figure 2-2: Spiral of organizational knowledge creation (Nonaka 1994)

In his spiral, knowledge moves upward in an organization, starting at the individual level, moving up to the group level, and then up to the organization level. Although the tacit knowledge held by individuals lies at the heart of the knowledge creating process, gaining access to the benefits of that knowledge requires dynamic interactions between four modes of knowledge conversion (Nonaka 1994:20). Organizational knowledge creation occurs when all four of these modes form a continuous cycle.

The first mode of knowledge conversion, *socialization*, denotes the experiential processes through which tacit knowledge is shared among individuals. *Combination*, the second conversion mode, ties together different bodies of explicit knowledge held by individuals through processes such as meetings, telephone conversations, and document exchanges. This reconfiguration of existing knowledge can lead to the creation of new knowledge (Nonaka 1994). The third mode, *externalization*, is the conversion of tacit knowledge to explicit knowledge. Through the use of metaphorical dialogues, individuals and groups “articulate their own perspectives, and thereby reveal hidden tacit knowledge that is otherwise hard to communicate,” (Nonaka 1994:20). By means of *internalization*, the fourth knowledge conversion mode, explicit knowledge is converted to tacit knowledge. Internalization occurs through some form of ‘learning by doing’ activities in which concrete, articulated concepts emerge in iterative trial-and-error processes (cf. Epple, Argote, & Devadas 1991; Darr, Argote, & Epple 1995).

Organizations can either learn from their own experiences or from the experiences of others (Levitt & March 1988; Huber 1991). In their research on networks in the biotechnology industry, Walter Powell and his colleagues found that firms rely on external relationships for knowledge, learning from collaboration with other firms how to access and how to distribute relevant knowledge (Powell, Koput, & Smith-Doerr 1996; Powell 1998). However,

Darr & Kurtzberg (2000) call attention to the fact that the search for the most relevant knowledge from a wide choice of potential knowledge sources can be difficult. They claim that this search process can be facilitated by partner similarity. In a quantitative and qualitative study of franchise organizations they found that strategic similarity created a context favorable to knowledge transfer between two organizations, whereas geographic and customer similarity did not encourage knowledge sharing.

According to a growing number of scholars and practitioners, knowledge cannot be managed (e.g., Streatfield & Wilson 1999; von Krogh, Ichijo, & Nonaka 2000; Cross, Parker, Prusak, & Borgatti 2001; Darr & Kurtzberg 2000), but knowledge sharing can be supported by acting on certain contextual and organizational variables that influence knowledge flows. Gupta & Govindarajan (1991) identify the task environment, organizational structural characteristics, and organizational cultural norms as key contextual variables affecting knowledge flows.

Researchers in the field of cognitive psychology have examined the extent to which one unit of an organization is affected by the experiences of another (Darr et al. 1995; Baum & Ingram 1998; Argote & Ingram 2000). Argote & Ingram (2000) stated that knowledge is embedded in knowledge repositories - members, tools, and tasks of organizations, which they call the three basic elements of organizations - and subnetworks formed by combining the basic elements. From this repository perspective, knowledge transfer involves the moving of elements and networks of elements within the organization. Alternatively, knowledge elements or networks can be modified through communication and training (Argote & Ingram 2000). The fundamental argument advanced in this literature is that knowledge embedded within a source needs to be replicated in the recipient to become effective (see e.g., Moreland, Argote, & Krishnan 1996; Wegner, Erber, & Raymond 1991; Argote & Ingram 2000; Epple et al. 1991). Such a replication

consists of knowledge transfer activities that allow the knowledge sources to be made accessible by the recipient (Nonaka 1994; Leonard-Barton 1988).

Another important influence on knowledge processes is given by the factors that affect the smoothness or difficulty of knowledge sharing. A predominant aspect lies in the nature of the knowledge itself: whether the knowledge being transferred is tacit or articulate has an important impact on the ease of transfer (Zander 1991). But even the sharing of articulate knowledge can often pose difficulties because of the recipient's lack of absorptive capacity and causal ambiguity (Szulanski 1996), and therefore its sharing can be costly (Grant 1996).

Yet, it can be costly if critical knowledge is *not* shared. Hoopes & Postrel (1999) defined the errors possible only because knowledge was not shared as 'glitches'. In a study of fourteen product development projects, they identified a set of syndromes that can lead to glitches:

1. Failure to employ integrating practices between project stages, functional specifications, and program architecture; such as meetings and intermediate adaptations of the specifications and architecture.
2. The integrating practices are used, but the initially knowing party fails to mention critical knowledge items to the ignorant party, e.g. because the knowing party takes that knowledge for granted.
3. An item of critical, previously not shared knowledge is identified by an integrating practice, but the initially ignorant party does not understand it (and consequently remains ignorant), while the initially knowing party assumes mistakenly that the knowledge has been transferred.

4. An item of knowledge was not initially shared and is difficult to transmit. The initially knowing party realizes that it cannot transfer that knowledge, but the ignorant party does not get this message and believes that everything is in order.

The last point illustrates what Szulanski (2000) termed “one of the most surprising lessons” (Szulanski 2000:10) from the recent scholarly interest in knowledge sharing: the fact that an individual somewhere in the organization possesses potentially valuable knowledge does not necessarily mean that somebody else of the same organization, or the organization itself, benefits from this knowledge. The reason for this is that transfers of knowledge can be difficult, an aspect which, “when acknowledged [by scholars], [...] is seen as an anomaly rather than as a characteristic feature of the transfer” (Szulanski 2000:10).

So what is it that makes individuals share their knowledge? At the group level, frequently discussed prerequisites for knowledge sharing are trust in the source-recipient relationship (Perloff 1993; Uzzi 1997; Edmondson 1999; Bouty 2000; Dirks & Ferrin 2001; Williams 2001), and motivation (Guzzo & Dickson 1996; Osterloh & Frey 2000). Researchers in the field of social psychology have used the notion of shared mental models to explain knowledge sharing and decision making (Cannon-Bowers, Salas, & Converse 1993; Langan-Fox, Code, & Langfield-Smith 2000; Mohammed & Dumville 2001). Mental models are organized knowledge structures that allow individuals to predict and explain the behavior around them, and to predict what is likely to occur next (Rouse & Morris 1986). Some types of mental models relevant to this study are presented in the figure below.

<b>Shared mental model</b>	<b>Knowledge content</b>	<b>Comment</b>
Technology	Equipment functioning Operating procedures System limitations Likely failures	Likely to be the most stable model in terms of content. Probably requires less to be shared among team members
Job/task	Task procedures Likely contingencies Likely scenarios Task strategies Environmental constraints Task component relationships	In highly proceduralized tasks, members will have shared task models. When tasks are more unpredictable, the value of shared task knowledge becomes more crucial
Team interaction	Roles/responsibilities Information sources Interaction patterns Communication channels Role interdependencies Information flow	Shared knowledge about team interactions drives how team members behave by creating expectations. Adaptable teams are those who understand well and can predict the nature of team interactions
Team	Teammates' knowledge Teammates' skills Teammates' attitudes Teammates' preferences Teammates' tendencies	Team-specific knowledge of teammates helps members to better tailor their behavior to what they expect from teammates

*Figure 2-3: Types of shared mental models (Mathieu et al. 2000)*

Shared mental models positively affect team process and performance, but the magnitude of the impact depends on the mental model being shared (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers 2000). Even if individuals have conflicting preferences for reaching a decision, but share similar mental models of the decision context, they are likely to come to an agreement (Richards 2001). On the other hand, the differentiation of roles in a team leads to less knowledge transfer and a decline in shared mental models over time (Levesque, Wilson, & Wholey 2001). The table below gives a summary of the discussed perspectives on knowledge sharing.

<b>Perspective</b>	<b>Focus</b>	<b>Theories</b>
Transfer modes	Imitation	Competitive advantage becomes sustainable when barriers to imitation are raised. Imitation can be deterred by innovation (Reed & DeFillippi 1990; Kogut & Zander 1992) Internal barriers to imitation are the recipient's lack of absorptive capacity and causal ambiguity (Szulanski 1996) Credible commitment to stakeholders allows a firm to control imitation (McEvily et al. 2000)
	Learning	Organizational learning is a process through which the knowledge held by individuals is amplified, internalized, and externalized as part of an organization's knowledge base (Nonaka 1994) Knowledge acquired through learning by doing is embodied in an organization's technology (Epple et al. 1991; Darr et al. 1995) Strategic similarity affects transfer by allowing a more efficient search (Darr & Kurtzberg 2000)
Influencing factors	Experiences	One unit of an organization is affected by the experiences of another (Darr et al. 1995; Baum & Ingram 1998; Argote & Ingram 2000)
	Trust	A prerequisite for knowledge sharing is trust in the source-recipient relationship (Perloff 1993; Uzzi 1997; Edmondson 1999; Bouty 2000; Dirks & Ferrin 2001; Williams 2001)
	Motivation	Knowledge transfer depends on motivation (Guzzo & Dickson 1996); both intrinsic and extrinsic (Osterloh & Frey 2000)
	Mental models	Shared mental models positively affect team process and performance (Mathieu et al. 2000) The differentiation of roles in a team leads to less knowledge transfer and a decline in shared mental models (Levesque et al. 2001)

*Table 2-1: Knowledge sharing in the literature*

As the reviewed theories show, the way knowledge is shared has a deep impact on its effectiveness: how decisions are made, whether knowledge is transmitted explicitly or internalized through a learning process, whether people trust each other, are motivated, or share the same mental models; all these factors determine the mechanisms, and hence the effectiveness, of knowledge sharing. Therefore, a first fundamental question this dissertation addresses is the following:

*Q1: What are the objectives, modes, and influencing factors of knowledge sharing in DGPs?*

### **2.1.1 Cultural context and influence**

This study examines four groups in two different countries, each of them part of a bigger organization. Intuitively, one would assume that the cultural context of these groups plays an important role in how knowledge is shared within each group. Although scholars do not necessarily agree on *how* the context in which a group is embedded impacts the group's functioning, they agree on the fact that there *is* an influence (e.g., O'Connor 1997; Sutton & Hargadon 1996; Williams 2001; Zack & McKenney 1995). The cultural context has been studied intensely by organization theorists since the early 1980's (cf. Frost, Moore, Louis, Lundberg, & Martin 1985), mainly using one of the following approaches (Ingersoll & Adams 1992):

1. Each organization is unique, and culture is particularized as something that is emergent within each organization (e.g., Schein 1996).
2. A number of organizations' emergent cultures are considered in order to examine commonalities, and thus to arrive at some encompassing characterization of organizational culture (e.g., Sackmann 1991).
3. Examination of the culture at large (e.g., the national culture) to seek aspects that are important across many organizations (e.g., Hofstede 1991).

Ingersoll & Adams criticize the first two approaches in particular for confusing subcultures as culture, and sometimes even treating the subcultures

as independent of the culture at large. This certainly represents a risk that I incur in my own investigation, which I try to overcome by limiting my interpretations of culture to the observed units of analysis (the DGPs), but in their context of national culture, following Schein's (1996) claim that "concepts for understanding culture in organizations have value only when they derive from observations of real behavior in organizations, when they make sense of organizational data, and when they are definable enough to generate further study" (Schein 1996:229). For the purpose of this study, culture is defined as shared norms, values, and assumptions (Schein 1980).

Cultural differences influence the cooperative behavior in and between groups (Cox, Lobel, & McLeod 1991; Sackmann 1992), but culture can also enable the formation of groups (Sackmann 1992). Sackmann (1991; 1992) proposes an intriguing theory on the emergence of cultural subgroups: Cultural subgroups tend to form around different kinds of organizational knowledge: (1) dictionary knowledge – the understanding of things and events; (2) directory knowledge – the commonly held cognitions concerning knowledge about processes; (3) recipe knowledge – the knowledge about what should be or should have been done to make things better; and (4) axiomatic knowledge – the knowledge that gives insight into why certain things are the way they are (Sackmann 1991, 1992). This "reverse influence" of knowledge on organizational structures was recently studied by Birkinshaw, Nobel, & Ridderstrale (2002), who argued that knowledge, being embedded in the system, is an important predictor of organizational structure.

Since this dissertation is a study across national cultures, organizations, and groups, it is important to examine the cultural differences and commonalities by understanding their influence on the conception and implementation of DGPs. Hence, the second research question I put forward is as follows:

*Q2: What role does the cultural context of DGPs play in their knowledge processes? How is knowledge sharing different in Swiss and US DGPs?*

### **2.1.2 Knowledge and technology**

Scholarly interest in the causal relationship between technology and knowledge processes predates the invention of computers. The prominence of the topic, however, has grown enormously with the event of computer technology, as Blau & Schönherr (Blau & Schönherr 1971) describe: “[m]achine technology has played a major role in many organizations for a long time, be they manufacturing concerns or armies, but its significance in government bureaus and other white-collar offices has been minor unto quite recently. The invention and production of computers changed the situation drastically, though conventional data-processing equipment had already brought about some lesser changes earlier. Even if computers are essentially used for routine accounting and record-keeping functions, [...] automation basically alters many operations,” (Blau & Schönherr 1971:50). Information technologies differ substantially from traditional technologies: in addition to affecting the production of goods and services, IT has the potential to affect the functioning of coordination and communication within an organization and between organizations (Fountain 2001). Hence, technology can be supportive of more efficient coordination and communication processes, but it can also stand in the way of efficiency and effectiveness when existing technologies, such as legacy information systems, determine the choice of new technologies, thus creating a path dependence (Fountain 2001).

In the relationship between technology and the individual, skill acquisition is important (Goodman, Griffith, & Fenner 1990): new technologies are generally more complex than traditional technologies, and

are provided by multiple vendors. This not only requires different areas of expertise from different parts of the organization, but more importantly, there is a need to integrate those different sources of knowledge about skills in order to make the technological system work as a whole. In addition, new technologies tend to involve various levels and parts of the organization, requiring more coordination efforts by multi-skilled people who work across boundaries. Therefore, the focus shifts “from acquisition of knowledge in a single role to knowledge across different roles,” (Goodman et al. 1990:57). Eventually, changes in work roles and their relations affect the structure of an organization’s social networks (Barley 1990).

The role of information technology in knowledge sharing has also been studied by communication theorists. Yates & Orlikowski (1999) analyzed how a firm adopted and used a new electronic medium, identifying different types of communication, or genres, that groups shaped according to their needs. Based on structuration theory, they argued that these patterns both reinforced and changed the social interactions within groups. O’Mahony & Barley’s (1999) critical review of empirical evidence supports this claim in saying that, at the workgroup level, digital forms of communication were found to buffer and link individuals, increase the number of activities that one can participate in, equalize participation and status differences, increase risk taking as a result of diminished social cues, and to result in a longer time to reach consensus.

A growing body of literature examines the relationship between technology-supported communication and organizational structures. In 1995, *Organization Science* dedicated a special issue to electronic communication and organizational forms (Fulk & DeSanctis 1995). Particularly relevant to this study are two articles: (1) Barua, Lee, & Whinston’s analysis of the complementarity effects between incentives, communication technology design, and organization and task characteristics. The authors show how

incentives and technology development approaches for traditional, hierarchical organizations may not be appropriate for flatter, team-based organizations (Barua, Lee, & Whinston 1995); and (2) Zack & McKenney's field study, where they showed that groups in varying organizational contexts adopted communication technology in different ways, resulting in different communication patterns that were consistent with and reinforcing to their existing social structure (Zack & McKenney 1995). Von Krogh (2002) arrives at a similar conclusion from a review of current theories on trust and the use of information systems: "[i]t could therefore be that communities that have some early record of physical interaction that establishes trust would more likely use information systems effectively than would communities without such records," (von Krogh 2002:99). Researchers at Hewlett Packard recently used a reverse approach to study the relationship between electronic communication and communities (Tyler, Wilkinson, & Huberman 2003): They identified informal communities from email logs ("to:" and "from:") within an organization, claiming that email communication is an effective predictor for organizational communication structures.

With respect to the effects of computerization on the nature of knowledge, Zuboff (1988) argues that there has been a shift from implicit knowledge of job skills to a more intellectual/rational process based on explicit process knowledge. She illustrates this argument with the work of a banker: "the work of the banker had entailed considerable technical and action-centered knowledge. The technical aspects were most subject to rationalization and so could be carved out and repositioned in lower-management or even clerical routines. With the growth of automated systems, this knowledge increasingly came to be lodged in software, further reducing the skill requirements of those lower-echelon jobs, transforming them into machine-oriented procedures," (Zuboff 1988:167). Building on Zuboff's work, Blackler (1995) categorized different types of knowledge taken from

the organizational and popular literature<sup>5</sup> to conclude that action-oriented skills (embodied knowledge) were being displaced by computer technologies (encoded knowledge). Hence by encoding information, technology disrupts existing pools of knowledge. Technology also affects embrained knowledge (through the development of expert computer systems and widening information access), encultured knowledge (through the introduction of communication systems and groupware), and embedded knowledge (through the development of integrated enterprise systems).

McDermott (1999) argues that recent developments in IT have inspired organizations to think about new ways of sharing knowledge, only then to discover that knowledge sharing is more dependent on building human communities (or functioning within a social network) than IT. In a similar vein, Roberts (2000) sees IT as a facilitator for knowledge transfer. However, IT has very little impact on a firm's production process when it comes to the transfer of tacit knowledge: "the transfer of know-how requires a process of show-how. Face-to-face demonstration and the social interaction involved enable the sharing of skills and the establishment of mutual understanding and trust (Roberts 2000: 440).

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<sup>5</sup> The categories were elaborated on those defined by Collins (1993). They are as follows: (1) Embrained knowledge – knowledge that depends on conceptual skills and cognitive abilities; (2) Embodied knowledge – knowledge that is action-oriented and rooted in specific physical context; (3) Embedded knowledge – knowledge that resides in systemic routines such as organizational procedures, rules, and regulations; (4) Encultured knowledge – the process for achieving shared understanding; and (5) Encoded knowledge – information conveyed by signs and symbols.

Since IT has the potential to positively or negatively affect the functioning of coordination and communication within an organization and between organizations, it is important to determine the role IT plays in the coordination and communication processes of DGPs. I address this issue with the following research question:

*Q3: How does the use of information technology affect knowledge sharing in DGPs?*

## **2.2 Coordination mechanisms of knowledge**

Scholars of many disciplines have studied formal and informal organizational structures as coordination mechanisms for knowledge processes. The role of hierarchies as opposed to markets, and increasingly the notion of networks, have been discussed as allocation mechanisms for knowledge (Powell 1990; Podolny & Page 1998). The main distinguishing factors of those different allocation forms are the locus of authority and control, and consequently the different ability to either transfer or develop tacit or explicit knowledge efficiently. Organization design theory suggests that the information capacity of coordination mechanisms should match information requirements of the task at hand (Galbraith 1973). Generally, the literature distinguishes three organizational forms with regard to the analysis of knowledge processes: markets, hierarchies, and networks (Powell 1990; Kogut & Zander 1996; Nault 1998; Podolny & Page 1998). Building on Coase's (1937) theory of the firm, which claims that firms exist to minimize the market's transaction costs and are therefore superior to markets, Kogut & Zander (1996) translate this theory to the knowledge of the firm: specialization, as a result of the division of labor, increases the costs of coordination and communication. Consequently, firms will only have an economic advantage over market transactions when procedural rules facilitate

the coordination of knowledge (Kogut & Zander 1996), and when they manage to coordinate the knowledge produced in different communities of practice (Brown & Duguid 2001).

In a hierarchy approach of allocation, knowledge is readily available in the organization, as the organization has complete control over the knowledge process. Bureaucracies rely on rationalized knowledge<sup>6</sup> that is collected mostly in databases, reports, or handbooks (Weiss 1998). In line with Weber's ([1921]1968) depiction of the ideal-type bureaucracy, individuals are arranged in a bureaucracy to carry out specialized tasks, based on explicit rules and procedures (Cyert & March 1963; Cohen & Bacdayan 1994). In this formal organization mechanism, knowledge is likely to be structured with explicit rules of action.

A recent network theory-based explanation for the theory of the firm argues that organizations have advantages over markets because they can mobilize social capital embedded in human relations in order to create intellectual capital (Nahapiet & Ghoshal 1998; Bouty 2000). In their groundbreaking article on social capital, Nahapiet & Ghoshal (1998) stated that social capital increases the efficiency of action and decreases transaction costs by encouraging cooperative behavior. Intellectual capital is created through the combination and exchange facilitated by social capital. Because organizations are characterized by interdependence and coordination, they buttress the development of social capital, which is co-owned by parties in a relationship. At the same time, organizations provide institutional settings for human interactions, which also create social capital.

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<sup>6</sup> It should be noted that while bureaucracies *rely* on rationalized knowledge, it certainly is not the only type of knowledge that has been observed in a bureaucracy. Tacit knowledge plays an important role in bureaucratic decisionmaking (cf. Blau 1963), which Max Weber ([1921]1968) referred to as "Dienstwissen" (knowledge on the job).

Prior research has shown that, while hierarchies are generally efficient for carrying out specialized tasks based on explicit rules and procedures (Arrow 1974; Cohen & Bacdayan 1994; Cyert & March 1963; Weber [1921]1968; Weiss 1998; Williamson 1975), informal networks more efficiently diffuse, utilize and integrate knowledge (Grant & Baden-Fuller 1995; Brown & Duguid 2001; Grant 1996; Kogut 2000; Kogut & Zander 1996; Nault 1998; Podolny & Page 1998; Powell 1990, cf. table below).

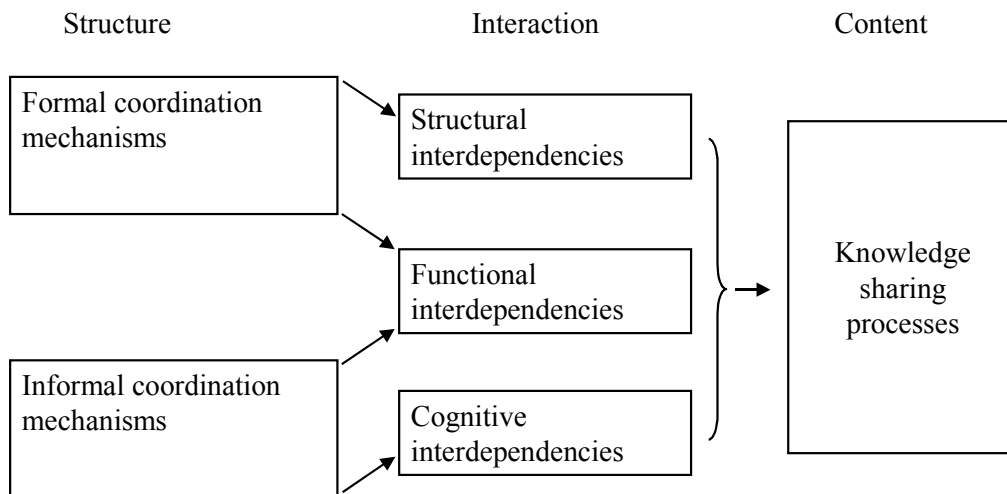
<b>Key Features</b>	<b>Hierarchy</b>	<b>Network</b>
Normative basis	Employment relationship	Complementary strengths
Means of communication	Routines	Relational
Methods of conflict resolution	Administrative fiat – supervision	Norm of reciprocity – reputational concerns
Degree of flexibility	Low	High
Amount of commitment among the parties	Medium to high	Medium to high
Tone or climate	Formal, bureaucratic	Open-ended, mutual benefits
Actor preferences or choices	Dependent	Interdependent

*Table 2-2: Comparison between hierarchies and networks (Powell 1990)*

Kogut & Zander (1992) propose several coordination mechanisms for knowledge transfer operating on different organizational levels. They argue that transfer of knowledge from an individual to a group level occurs through the development of unique language or code which allows group members to learn who knows what and to coordinate their activities. On the organizational level the transfer of knowledge within the same function (horizontally) is realized by boundary spanners. At the same time, a vertical transfer of knowledge among different organizational functions relies on the use of higher-order organizing principles through formal and informal structures. Coordinating different units to share their knowledge is critical to

enhance an organization's capabilities (Kogut & Zander 1996). Similarly, Tsai (2002) suggests that knowledge sharing within a multiunit organization requires both formal and informal structures as coordination mechanisms. Whereas Tsai differentiates between formal hierarchical structure and informal lateral relations, Gittell (2002) proposes a set of coordination mechanisms without specifying their formal or informal character: routines, boundary spanners, and team meetings.

The model below depicts the causal relationships of knowledge sharing in DGPs as these emerged from a first round of data analysis and the concurrent review of the theories presented in this chapter. This simplified representation attempts to bridge the organizational context, i.e. structures influencing knowledge sharing within the group (coordination mechanisms); the processes, i.e. the interaction between group members given their interdependencies (group dynamics)<sup>7</sup>; and the content of the knowledge that is being shared. Formal coordination mechanisms, e.g. hierarchies, are more likely to have an impact on structural interdependencies among the group members, such as relations that are linked to existing structures. On the other hand, informal coordination mechanisms, such as social networks, are prone to having a stronger influence on cognitive interdependencies, which refer to informal social communication. Both formal and informal mechanisms act upon functional interdependencies, i.e. goals and tasks that the group members have in common. Finally, all types of interdependencies form the interactions between the group members, which are at the basis of knowledge sharing processes within the group. Although this categorization is the result of a theoretical subdivision of processes which in reality are barely separable, the model proved to be useful for analytical structuring purposes in the early stages of the study.



*Figure 2-4: Causal model of knowledge sharing in DGPs*

For the purpose of this thesis, I look at two formal coordination mechanisms of knowledge, hierarchy and routines; and two informal coordination mechanisms, social networks and group dynamics. The remainder of the chapter examines these coordination mechanisms of knowledge in greater detail. Although multiple coordination mechanisms coexist and cofunction in DGPs, in order to understand the decisionmaking processes of DGPs it is important to determine which mechanisms prevail. Thus, the fourth research question reads as follows:

*Q4: What are the predominant coordination mechanisms for knowledge sharing in DGPs?*

<sup>7</sup> For a detailed description of group dynamics, see section 2.2.4.

### 2.2.1 Hierarchical structures

Formal hierarchical structures are one way to coordinate knowledge processes in complex organizations comprised of multiple specialized units (Tsai 2002). In hierarchies, communication occurs in the context of an employment relationship, and relationships are important, although the patterns of interaction are most strongly determined by an individual's position within the formal hierarchical structure (Powell 1990). Hierarchy is a distinctive feature of bureaucracy (Weber [1921]1968). Office hierarchy signifies that offices are ranked in a hierarchical order, with information flowing up the chain of command, directives flowing down: "the principles of office hierarchy and of levels of graded authority mean a firmly ordered system of super- and subordination in which there is a supervision of the lower offices by the higher ones. Such a system offers the governed the possibility of appealing the decision of a lower office to its higher authority, in a definitely regulated manner," (Weber [1921]1968:957).

The analysis of hierarchical structure as a coordination mechanism of communication has played an important role in organizational research. Exemplary elements of formal organizational structure are formalization, specialization, and centralization (van de Ven 1976). Frederick Taylor's "Principles of Scientific Management" ([1911]1967) probably depict the most blatant type of *formalization*. Scientific management involves a certain combination of elements which have not existed in the past, namely, existing knowledge is collected, analyzed, grouped, and classified into laws and rules that it is determined to be a science; accompanied by a complete change in the mental attitude of the working men as well as of those on the side of the management, toward each other, and toward their respective duties and responsibilities. In less extreme forms, standardization is a central characteristic of hierarchical structures, specifying tasks, standard operating procedures, rules, and policies to coordinate the performance of specialized

roles within an organizational component (van de Ven 1976). Role *specialization* refers to the subdivision of tasks among employees (van de Ven 1976), which renders work tasks highly interdependent in hierarchical structures (Powell 1990). Blau & Schönherr (1971) studied the relationship between specialization and standardization in employment security agencies, concluding that “insufficient rather than excessive standardization of personnel practice seems to foster the development of a rigid authority structure with responsibilities centralized in the hands of top management,” (Blau & Schönherr 1971:120), attributing this to the assumption that anxieties and insecurities as psychological effects of ‘excessive freedom from meaningful standards’ lead to authoritarian and conforming behavior.

Another traditionally mentioned feature of hierarchical structure is *centralization* based on an authority structure. From a coordination perspective, under certain circumstances a centralized structure can be beneficial to decisionmaking processes (Williamson 1975): if the requisite information-processing and decisionmaking talents are not widely distributed, it is more efficient to reserve “the central information collection and decisionmaking position to the one or few individuals who have superior information processing capacities and exceptional oratorical and decisionmaking skills,” (Williamson 1975:52). On the other hand, centralization could prevent a unit manager from exercising sufficient discretion in dealing with the demands of his or her task environment. This might be the cause for inefficiencies, as the knowledge transfer from the individual unit to the head of the agency is inclined to error and therefore retards decisionmaking (Poppo 1995). In addition, centralization can reduce the initiatives that a unit might take in inter-unit exchange, thus not being interested in sharing knowledge with other units unless required to do so by a higher authority (Tsai 2002).

In conformity with the elements of formal organization described in this section, I therefore pose the following research question:

*Q5: What roles do standardization, specialization, and authority play in DGPs? How does centralized/decentralized structure affect knowledge sharing in DGPs?*

### **2.2.2 Organizational routines**

Most efforts to analyze organizational knowledge have tended to investigate the notion of routines in the context of organizational learning (March & Simon 1958; Cyert & March 1963). Organizational routines facilitate coordination action by prespecifying the tasks to be performed and the sequence in which to perform them (Gittell 2002). Organizational routines are “patterned sequences of learned behavior involving multiple actors who are linked by relations of communication and/or authority” (Cohen & Bacdayan 1994:555); i.e. they capture the lessons learned from previous experiences, enabling the replication of a process without reinventing the wheel (Levitt & March 1988).

In organization design theory, routines are seen as mechanisms that work by reducing the amount of interaction needed among participants, thus representing a low-cost coordination mechanism (Galbraith 1973). However, since routines are considered low-bandwidth (March & Simon 1958) and therefore decreasingly effective under conditions of uncertainty (Galbraith 1973; Tushman & Nadler 1979), they seem to work best in low-uncertainty settings (Gittell 2002). Whereas routines may be simple sequences, “their interesting feature is their ability to support complex patterns of interactions between individuals in the absence of rules, directives, or even significant verbal communication,” (Grant 1996:115).

Stinchcombe (1990) argued that routines need to be distinguished along two variables: (1) the extent to which elements of human discretion influence the routine, and (2) the complexity of the routine. According to Stinchcombe, these two variables allow determination of how complex the knowledge of each individual working on a certain process needs to be, thus determining the required skill level of the individual, and adjusting the level of complexity accordingly by increasing or decreasing the number of decisions to be made by one individual.

Gersick & Hackman (1990) described the ‘importation’ of routines as the process through which groups follow routines not developed by their own members. Drawing on Bettenhausen’s & Murnighan’s (1985) model of group norming, they argued that “group interaction will unfold immediately in a well-coordinated fashion if (a) group members’ scripts are similar to one another’s and (b) members’ definition of the situation are also similar. In effect, the norm [routine] is imported and the absence of disagreement and miscues implicitly affirms that all members accept it” (Gersick & Hackman 1990:76). This requires that the group members are familiar with the routines and are relatively homogeneous, “especially regarding previous experience with the work and/or membership in a strong, common organizational culture,” (Gersick & Hackman 1990:77). Hackman’s (1969) research on the role of tasks showed that when a group member faces a new assignment that is similar to his or her prior experience, the member will be prompted to recall, and be predisposed to act in accord with, routines that have worked in the similar situation. To the extent that all group members have similar previous experiences, they can draw on their tacit knowledge of similar routines to guide their actions. Louis & Sutton (1991) found that the same was true with respect to members who share a strong, common organizational culture or ideology. Therefore, from this importation perspective, the transfer of knowledge embedded in routines requires the formation of experientially and culturally homogenous groups (to ensure that they share similar tacit

knowledge about how to work) who are then given a determined task (Cummings 2002).

### **2.2.3 Social networks**

Digital government projects have a networking effect on bureaucracies. The fact that individuals with differing skill sets and from different organizational units work on a common task creates a network that coexists with the functional subdivision of tasks within the organization; or, in Fountain's (1999) words, intra-organizational networks "subsume relations between and among actors under a governance structure that handles conflict resolution and channel behavior," (Fountain 1999:65).

Informal coordination mechanisms are not new to the public sector. Lindblom (1959) described the decisionmaking process of public administrators as the "science of muddling through". In this approach, also called the "branch method", the administrator defines a relatively simple goal, then compares a limited set of alternatives, which are the ones that "occurred to him", relying "heavily on the record of past experience with small policy steps to predict the consequences of similar steps extended into the future," (Lindblom 1959:79). The administrator's "intimate knowledge of his past sequences" could be a barrier to communication, but "an understanding of it promises an enrichment of intellectual interaction in policy formulation," (Lindblom 1959:88). Thus, even in the most bureaucratic settings, informal social relations are an important source of task advice (Blau 1963; Dalton 1959; Kanter 1977), and can affect the content and quality of decisionmaking (Crozier 1964; Hickson, Hinings, Lee, Schneck, & Pennings 1971). Furthermore, as Granovetter (1992) stated, "one [...] reason why people conduct their economic activity through networks of known

personal acquaintances is that sociability, approval, status, and power are central human motives,” (Granovetter 1992:26).

The study of organizational social networks has attracted the attention of scholars from different fields for many years (for a review, see McPherson, Popielarz, & Drobnic 1992). A social network consists of a finite set of actors<sup>8</sup> and the relations defined on them (Wasserman & Faust 1994) Of particular relevance to this study are theories regarding structure and content of these relations.

### *Structure*

The structure of social networks builds around the positions and roles of the involved actors, and the ties that exist between them. An important distinction in social network theory is made between strong and weak *ties*, i.e. the frequency or intensity, also termed ‘quantity’ of ties. Whereas strong ties tend to bind cliques<sup>9</sup> of individuals and primarily convey within-group knowledge, weak ties bridge cliques and are therefore source of new knowledge (Granovetter 1973). However, knowledge sharing in networks requires strong ties (Hansen 1999; Dyer & Nobeoka 2000). In a study on the performance of organizational teams, Ancona & Caldwell draw together internal and external ties of teams, finding that teams engage in vertical communications aimed at molding the views of top management, and in horizontal communication aimed at coordinating work and obtaining feedback. They show that the type of external communication teams engage in, not just the amount, determines performance.

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<sup>8</sup> Actors can refer to individuals, groups, or organization. In this study, I use the term ‘actor’ to refer to an individual.

<sup>9</sup> A clique is defined in Social Network Analysis as a “maximal complete subgraph of three or more nodes, all of which are adjacent to each other, and there are no other nodes that are also adjacent to all of the members of the clique,” (Wasserman & Faust 1994:254).

## Content

In classical social network analysis (SNA), the types of networks are distinguished by the relational content of the ties. Knoke & Kuklinski (1982:15) list the following common types of relational content:<sup>10</sup>

- *Transaction relations*: Actors exchange control over physical or symbolic media, e.g. in gift giving or economic sales and purchases (Laumann, Galaskiewicz, & Marsden 1978; Burt 1980; DiMaggio & Louch 1998);
- *Communication relations*: Linkages between two actors are channels by which messages may be transmitted from one actor to another (Lin 1975; Kettinger & Grover 1997; Brown & Miller 2000; Monge & Contractor 2003);
- *Boundary penetration relations*: The ties between actors consist of constituent subcomponents held in common, e.g. boards of directors with overlapping members (Levine 1972; Mariolis 1975; Mizruchi 1996; Gulati & Westphal 1999);
- *Instrumental relations*: Actors contact one another in efforts to secure valuable goods, services, or information, e.g. a job, political advice, or recruitment to a social movement (Granovetter 1974; Ibarra 1992; Flap & Volker 2001);
- *Sentiment relations*: Networks in which individuals express their feelings of affection, admiration, deference, loathing, or hostility toward each other (Hallinan 1978; Labianca, Brass, & Gray 1998; Hinds, Carley, Krackhardt, & Wholey 2000);

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<sup>10</sup> The representative studies prior to 1982 were cited by Knoke & Kuklinski (1982). I have added some more recent studies to their original list.

- *Authority/power relations*: These networks indicate the rights and obligations of actors to issue and obey commands (White 1961; Cook & Emerson 1978; Ibarra & Andrews 1993; Human & Provan 1997; Fiol, O'Connor, & Aguinis 2001);
- *Kinship and descent relations*: A special instance of several preceding types of networks, these bonds indicate role relationships among family members (Nadel 1957; White 1963; Warriner & Moul 1992; Padgett & Ansell 1993).

Of particular interest to this study is the recent concept of knowledge networks (Contractor, Carley, Levitt, Monge, Wasserman, Bar, Fulk, Hollingshead, & Kunz 2000; Hansen 2002; Monge & Contractor 2003), indicating that the content of ties between actors consists of some form of knowledge. The location of knowledge within a network of actors varies along a continuum, spanning from knowledge residing with one actor to knowledge distributed among many actors (Farace, Monge, & Russell 1977). Distributed knowledge can refer either to the flow (or diffusion) of knowledge, increasing the level of knowledge among all actors, or to the parts of a larger knowledge base, possessed by separate actors within the network who each contribute rather unique, non-redundant knowledge to the network, enabling the collective to accomplish complex tasks (Contractor et al. 2000). At the individual level, actors have their own perceptions of the knowledge network; i.e. each actor has his or her own ideas about the distribution of knowledge among actors in the network. Therefore, “all actors within an observable knowledge network have their own *cognitive knowledge networks*, which refer to their perceptions of the overall observable knowledge network,” (Contractor et al. 2000:5). Furthermore, knowledge networks are characterized by fluidity of actors and their ties: Based on the tasks to be accomplished, their interests, resources, and commitments, actors join or leave a knowledge network. In addition, the ties within a knowledge

network are prone to change with evolving tasks, the distribution of knowledge, or changes in the actors' cognitive knowledge networks (Contractor et al. 2000). Lazer (2001) takes the concept of network fluidity further by arguing that the network structure influences individuals and is in turn influenced by them. In a study of a large government agency he found that network elasticity varies according to whether the network is intra- or extraorganizational: while extraorganizational networks are characterized by fluidity, intraorganizational networks tend to be rigid.

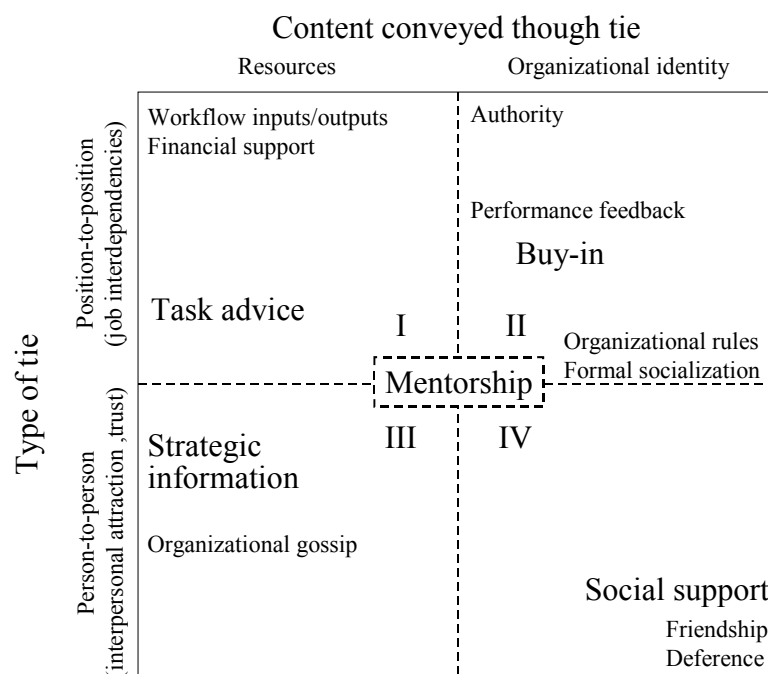


Figure 2-5: Typology of the content of network ties (Podolny & Baron 1997)

Podolny & Baron (1997) investigated the interaction between structure and content of social network ties (see figure above). Network ties are classified along two dimensions: the type of tie (along the vertical axis, differentiating between ties that primarily link positions and ties that primarily link persons), and the content of the tie (along the horizontal axis, distinguishing between ties that transfer resources and ties that transfer

identity or normative expectations). In a 2x2 matrix, the authors positioned examples of the content that might flow through the ties in each quadrant.

Given that DGPs rely heavily on informal networks for pooling the required knowledge, the analysis of the structure and content of these informal ties constitutes a central component of this study. The sixth research question addresses this important component as follows:

*Q6: What are the structure and content of ties in DGPs? How do they affect knowledge sharing in DGPs?*

#### **2.2.4 Group dynamics**

As the majority of decisionmaking processes concerning the conception and implementation of DGPs take place within the project group, group dynamics play an important role in knowledge sharing. A group is defined here as any number of people who interact with one another, are psychologically aware of one another, and perceive themselves to be a group (Schein 1980).<sup>11</sup> Knowledge sharing within groups is influenced by the expertise, knowledge, and information that group members bring to the group (Jackson 1996), and its processes and structures affect a group's performance (Hackman 1987; Rulke & Galaskiewicz 2000). Furthermore, how knowledge is shared within a group depends on the group's cultural characteristics (Cox et al. 1991; Earley 1994; Ely & Thomas 2001; Erez & Somech 1996; Gibson 1999; Larkey 1996; Watson, Kumar, & Michaelsen 1993).

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<sup>11</sup> Much of the literature discussed in this chapter has its origins in research on teams, i.e. a group with clearly defined membership whose members are interdependent to perform a specific task and which operates in the context of a larger organization (Alderfer 1977). I will be using the broader notion of group in this study to accommodate work groups whose boundaries are not clearly defined.

The framework of group dynamics is one that views people as coexisting in groups because of interdependencies that link them together (Lewin 1948). Lindenberg (1997) discusses why the group-dynamics research traditions, that seemed to promise in the 1960s a synthesis between ethnographic findings (e.g., Homans 1950) and experimental studies (e.g., Bavelas 1950), soon fell apart into specialized strands, which he identifies as functional (see Homans 1950), cognitive (see Sherif 1936), and structural (see Cartwright & Harary 1956) interdependencies; each with significant but limited success. Lindenberg argues that for these strands to be reintegrated, it is necessary to change from social exchange theory<sup>12</sup> to a theory of production, where exchanges are governed by exigencies of production. Such a theory must include a theory of goals and a theory of framing (limited or cognitively framed rationality) that connects goals and functional interdependence with social cognition. Further, as groups are always connected in a production process with other groups, they must be studied as networked entities (Lindenberg 1997).

The study of functional, cognitive, and structural interdependencies in groups has interested scholars beyond the field of social psychology (Forsyth 1983). Some examples include:

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<sup>12</sup> Social exchange theory (e.g., Homans 1958) is a theory based on economic principles (marginal utility, preferences, exchange of commodities) applied to the analysis of social behavior. The typical extrinsic benefits which are socially exchanged, such as advice, invitations, assistance, or compliance, have a distinctive significance of their own that is independent of their supplier, yet an individual's preferences for them are also affected by his or her interpersonal relations with the supplier. Although the quality of advice determines its basic value for an individual, regardless of who furnishes it, the individual tends to prefer to consult a colleague whose friendly relations with him or her make it easy to do so, rather than a more expert consultant whom the individual hardly knows.

- *Functional interdependence* indicates the interdependence concerning group goals or tasks. This functional interdependence stands at the origin of group formation: Members of a group generally share a common goal or task that cannot be reached by an individual alone (Alderfer 1977; Hackman 1987).

Gittell's (2001) concept of 'relational coordination', i.e. the management of task interdependencies, emphasizes the role that communication and relationships play in the coordination process: coordination in the presence of functional interdependence is carried out through relationships of shared goals, shared knowledge, and mutual respect, or through relationships characterized by the lack thereof. In a study of health care provider groups, she found that high levels of relational coordination in a work process had positive effects on work group performance.

- *Cognitive interdependence* refers to informal social communication, informal social comparison, and norms. People depend on others for the validation of their beliefs, which they jointly adjust or newly form in groups.<sup>13</sup> In his well-known case study of a federal enforcement agency, Blau (1963) observed consultation among colleagues within the agency. Blau concluded that consultation among colleagues contributed to effective operations in their agency, though at some social cost, as department supervisors required that agents turn to them instead of consulting among colleagues. Regarding social status, Blau observed that members of a group were especially attracted to the colleagues whose abilities they respected, leading to an integrated

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<sup>13</sup> Lindenberg notes that this type of interdependence is akin to a Durkheimian collective sentiment, the interdependence being cognitively mediated. Durkheim ([1893]1933) argued that such a sentiment is based on routine collective action, which is the product of shared belief and serves to renew such belief.

position of members with “superior competence” (Blau 1963:156) in the group.

- *Structural interdependence* comprises a vast array of structural relations, such as different communication structures according to the group atmosphere, or the existence of cliques within larger groups.

March & Simon (1958) observed the structure of problem-solving processes at the group level. These processes are governed by hierarchically structured programs, which are both procedural (problem goes through a sequence of broad phases, e.g. problem formulation, search for alternatives, evaluation of alternatives, etc.), and substantive (problem is first analyzed in broad terms, then each of its aspects becomes a subproblem to be further analyzed in detail (March & Simon 1958:201).

As the theories described above demonstrate, all forms of interdependencies affect communication, and hence knowledge sharing, within a group. The final research question is therefore directed at identifying these interdependencies in the four DGPs that are the subject of this study:

*Q7: What are the functional, cognitive, and structural interdependencies in DGP groups?*

## 2.3 Summary

This chapter reviewed literature on knowledge sharing, its influencing factors, and the coordination mechanisms of knowledge as a theoretical foundation for studying knowledge sharing processes in DGPs. The review ties together various disciplines, drawing on organizational theory, social psychology, and sociology. The framework in the figure below illustrates the questions I raised in this review of the literature on knowledge sharing, coordination mechanisms, and influencing factors of knowledge sharing. These questions are summarized in the table following the conceptual framework.

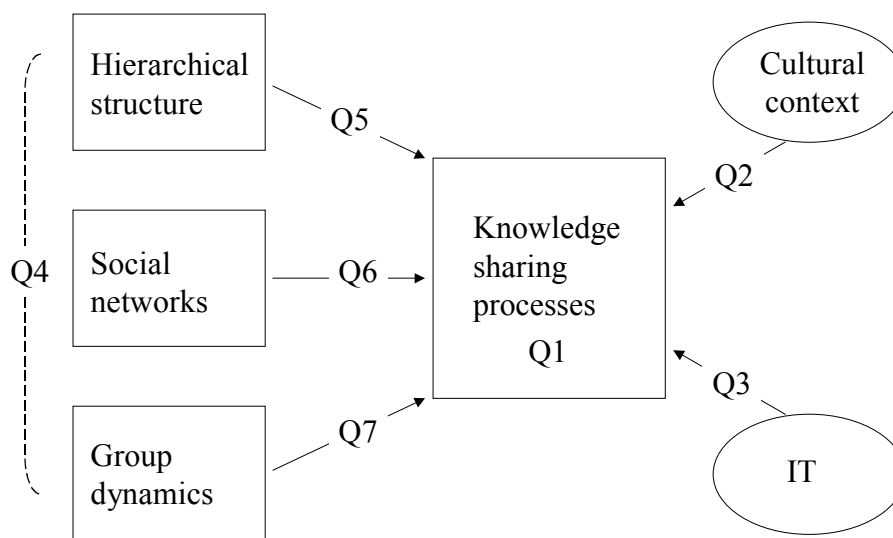


Figure 2-6: Conceptual framework

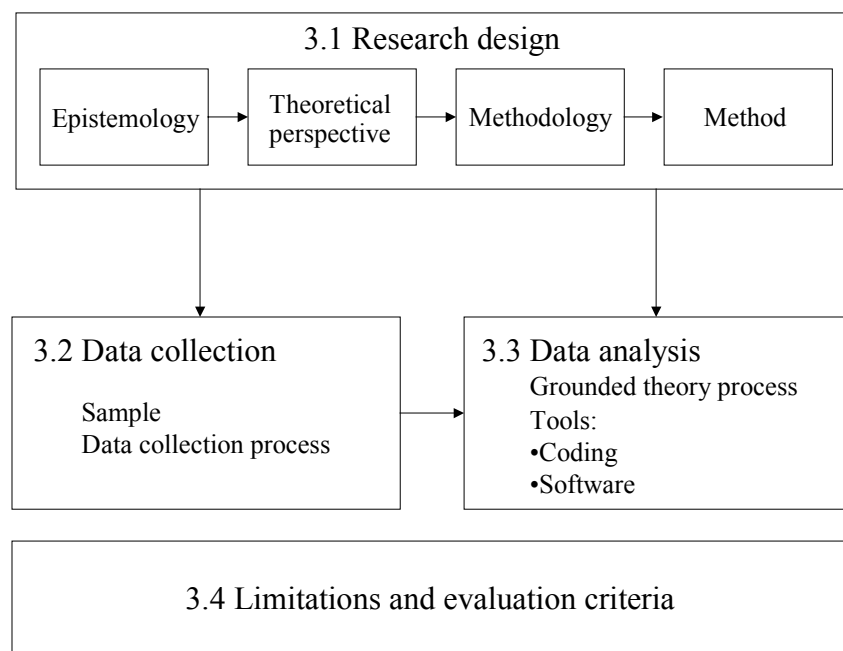
	<b>Research question</b>
Q1	What are the objectives, modes, and influencing factors of knowledge sharing in DGPs?
Q2	What role does the cultural context of DGPs play in their knowledge processes? How is knowledge sharing different in Swiss and US DGPs?
Q3	How does the use of information technology affect knowledge sharing in DGPs?
Q4	What are the predominant coordination mechanisms for knowledge sharing in DGPs?
Q5	What roles do standardization, specialization, and authority play in DGPs? How does centralized/decentralized structure affect knowledge sharing in DGPs?
Q6	What are the structure and content of ties in DGPs? How do they affect knowledge sharing in DGPs?
Q7	What are the functional, cognitive, and structural interdependencies in DGP groups?

*Table 2-3: Overview of research questions*



### 3. Methodology and data analysis

This study combines a qualitative exploratory case study design (Yin 1994) and a grounded theory approach (Glaser & Strauss 1967), with the aim of theory building through the comparative analysis of case studies (Eisenhardt 1989). The present chapter discusses the key methodological issues and the data analysis of this thesis. I display the research design along four elements of the research process (Crotty 1998), starting from the adopted epistemology (constructionism), I describe the theoretical perspective of the study (interpretivism), the methodology (grounded theory), and the method I adopted (case study). Subsequently, I trace the actual work process from sampling to data analysis. The chapter concludes with limitations and evaluation criteria. The figure below gives an outline of the chapter.



*Figure 3-1: Outline of chapter 3*

### 3.1 Presentation of the research design

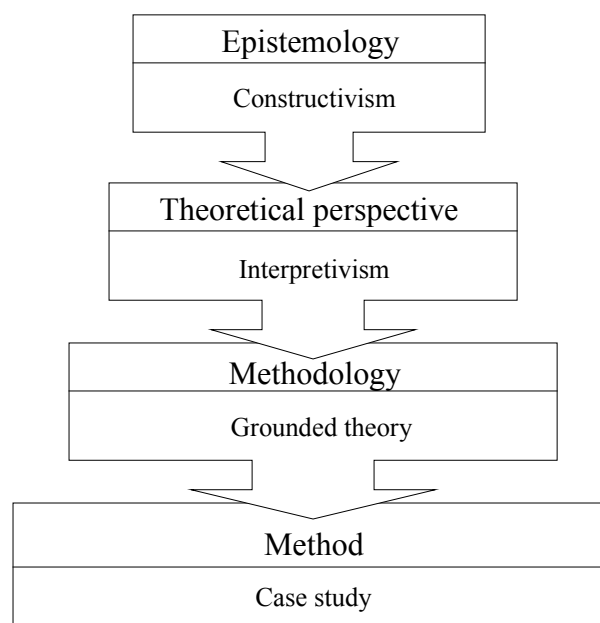
Conducting social research is a creative process that continuously challenges the mind of the researcher. However, qualitative research can at times be quite confusing. For example, grounded theory is sometimes assumed to be a theory, as its name suggests, whereas grounded theory is actually a methodology (Glaser & Strauss 1967; Glaser 1978; Strauss & Corbin 1990, 1997; Charmaz 2000). This section attempts to clarify the theoretical perspective behind this methodology and its relationship to the case study method by describing the research process in terms of four elements (Crotty 1998):

1. *Methods* – the techniques or procedures used to gather and analyze data related to the research questions; i.e. exploratory case studies (Yin 1994) in this thesis;
2. *Methodology* – the strategy, plan of action, process or design lying behind the choice and the use of particular methods and linking the choice and the methods to the desired outcomes; i.e. grounded theory (Glaser & Strauss 1967; Strauss & Corbin 1990);
3. *Theoretical perspective* – the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria; i.e. interpretivism (Weber [1921]1968; Mead 1934);
4. *Epistemology* – the theory of knowledge embedded in the theoretical perspective and thereby in the methodology; i.e. constructionism (Merleau-Ponty 1962)<sup>14</sup>.

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<sup>14</sup> For a definition of epistemology, see section 3.1.1.

Although the natural research process generally leads the researcher to first think about methods and methodologies, and in a second step about how to justify the choice and use of those methods and methodologies (Crotty 1998), the logical sequence of the elements of the research process is in reverse order, going from a philosophical meta-level to operational tools. The following sections discuss the elements in their logical order, as presented in the figure below.



*Figure 3-2: Research design*

### **3.1.1 Constructionist epistemology**

Epistemology is the branch of philosophy that studies the nature of knowledge, its presuppositions and foundations, and its extent and validity (American Heritage Dictionary 2000). In the interpretation of von Krogh & Roos, epistemology "... is concerned with understanding the origin, nature and validity of knowledge: it seeks to provide knowledge about knowledge,"

(von Krogh & Roos 1995:7)<sup>15</sup>. The researcher needs to identify, explain, and justify the epistemological stance he or she has adopted, because the epistemology provides a philosophical grounding for the decision on what kinds of knowledge are possible, and how it can be ensured that they are both adequate and legitimate (Crotty 1998:42).

This research is based on a constructionist epistemology (cf. Merleau-Ponty 1962):<sup>16</sup> Constructionism is “the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context,” (Crotty 1998:42). From the constructionist viewpoint, meaning – or truth – cannot be described simply as ‘objective’. Yet, constructionism cannot be described as simply ‘subjective’. Crotty uses an example from nature to explain the concepts of objectivism and subjectivism: In the objectivist view, a tree is a tree, regardless of whether anyone is aware of its existence or not. Therefore, the tree carries an intrinsic meaning. In contrast, the subjectivist argues that the object makes no contribution to the generation of meaning. In terms of the tree metaphor, the tree has no intrinsic meaning from the subjectivist perspective, its meaning being imposed on it by the subject without an interaction between the two. If constructionism is neither simply objective nor simply subjective, how can its nature be described? Merleau-Ponty (1962) pointed out that the world and the objects in the world are indeterminate. They might bear a potential meaning, but actual meaning

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<sup>15</sup> For an overview of the meaning of epistemology, see e.g. Greco (1998).

<sup>16</sup> To some scholars, constructionism is different from constructivism, although the terminology in the literature is far from consistent (Crotty 1998) (see Ryle 1949 for a discussion on the misapplication of epistemological terms). For example, Gergen (1994) distinguishes between social constructionists and psychological constructivists. I use the terms ‘constructionist’ and ‘constructionism’ here to discuss the social phenomenon of knowledge sharing in groups.

emerges only when consciousness engages with them. In other words, there cannot be a meaning without a mind. There needs to be a relationship that ties together objectivity and subjectivity, and precisely this relationship is established by constructionism. “The meanings are thus at once objective and subjective, their objectivity and subjectivity being indissolubly bound up with each other,” (Crotty 1998:48).

One of the underlying assumptions of qualitative research methodology is that human beings themselves organize, create and change the structures they live in. Aspects of meaning are only derived from individuals’ perceptions and their interpretations of social interactions (Denzin & Lincoln 1994; Guba & Lincoln 1994). These assumptions imply that structures are not solid but constantly change. Therefore, they are not measurable with rigid tools and statistical laws. Qualitative research tries to integrate measurable and objective data as well as tacit interpretations and perceptions. This is achieved by assessing all important issues and conditions essential to the research questions. Therefore, qualitative research methodology does not define hypotheses prior to the actual empirical observation.<sup>17</sup> The constructionist epistemology appears to be a suitable orientation for this study, as it emphasizes the socially constructed nature of individuals and groups through collaboration and connectedness.

### **3.1.2 Choosing an interpretivist approach**

Although the ideal starting point for theory-building research is to have “no theory under consideration and no hypotheses to test” (Eisenhardt 1989:536), every researcher brings a number of assumptions to the research task. The theoretical perspective is a statement of these assumptions, and it is

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<sup>17</sup> In reality the researcher brings hypotheses to the research tasks that are inherent to his or her epistemological orientation, experiences and beliefs (cf. section 3.1.2).

reflected in the methodology as it is applied (Crotty 1998). The interpretivist approach seems particularly well-matched for this study, interpretivists argue that human, or social, action is different from the movement of physical objects in that the former is inherently meaningful. Thus, to understand a particular social action (e.g., collaboration), the researcher must be aware of the meanings that form that action. Therefore, in order to be able to state that human action is meaningful, one has to claim either that the action is to a certain extent intentional, or that the meaning of an action can only be understood in terms of the system of meanings to which it belongs (Schwandt 2000).

Interpretivism emerged in the late 19th and early 20th centuries as a reaction to the then-dominant philosophy of positivism. This reflects a perennial debate in the philosophy of social science: Should the social sciences strive to emulate natural science methods, or is understanding social phenomena something essentially different from explanation in the natural sciences? While the naturalists say that the social sciences should be like the natural sciences, the interpretivists assert otherwise. Interpretivism is often associated with Max Weber ([1917]1969), who suggested that the human sciences center around *Verstehen* (understanding): "Sociology [...] is a science which attempts the interpretive understanding of social action in order thereby to arrive at a causal explanation of its course and effects. In 'action' is included all human behaviour when and in so far as the acting individual attaches a subjective meaning to it. Action in this sense may be either overt or purely inward or subjective; it may consist of positive intervention in a situation, or of deliberately refraining from such intervention or passively acquiescing in the situation. Action is social in so far as, by virtue of the subjective meaning attached to it by the acting individual (or individuals) it takes account of the behaviour of others and is thereby oriented in its course," (Weber [1917]1969:210).

Thus, by choosing an interpretivist approach embedded in a constructionist epistemology, the main assumptions that I bring to this study are the following:

1. Digital government projects (DGPs) are essentially constructed out of a combination of various social actions;
2. By analyzing the meaning of these social actions, I can understand the social processes that shape DGPs;
3. Knowledge sharing in DGPs needs to be interpreted taking into account the institutional and cultural context in which the projects are located.

### **3.1.3 Grounded theory**

Grounded theory methodology consists of systematic inductive guidelines for collecting and analyzing data to build middle-range theoretical frameworks that explain these data (Charmaz 2000). The methodology was developed by Barney Glaser and Anselm Strauss (1967) at a critical point in the history of social science, when the dominant view was that only quantitative studies can provide systematic social scientific research. The following two streams of work and thought contributed to the development of grounded theory approach: (1) American Pragmatism (Dewey 1937) and symbolic interactionism (Mead 1934) with an emphasis on action and the search for method in the context of problem solving; and (2) Chicago school sociology (e.g., Park & Burgess 1925; Hughes 1971), with a long tradition of ethnographic procedures to study social processes. The Chicago school particularly emphasized the influence of culture on individual and collective behavior. Researchers made extensive use of field observations and interviews as data collecting techniques, with the intention of integrating the

individual's perspective for understanding interactions, processes and social change.

Prior to the publication of Glaser & Strauss' "*The Discovery of Grounded Theory*" in 1967, qualitative analysis had barely been taught. It is therefore not surprising that the pioneering written guidelines for conducting systematic qualitative research were based on a positivistic epistemology. Glaser had studied with Paul Lazarsfeld at Columbia University, and he applied the rigorous training he had received in multivariate analysis to the development of qualitative analysis. Grounded theory methods were further developed and refined over time, and although moving into partly conflicting directions (cf. Glaser 1978; Strauss 1987; Strauss & Corbin 1990), they continuously strengthened a positivistic view with objectivist underpinnings (Guba & Lincoln 1994).<sup>18</sup>

Charmaz (2000) proposed a constructionist approach to grounded theory with the purpose of reclaiming the grounded theory tools from positivism "... to form a revised, more open-ended practice of grounded theory that stresses its emergent, constructivist elements," (Charmaz 2000:510). The present thesis follows the methodological suggestions of Strauss (1987) and Strauss & Corbin (Strauss & Corbin 1990) as adjusted by Charmaz (2000), since it places social interactions and processes at the center of its attention from a constructionist perspective. I will describe the detailed work process in section 3.3.1.

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<sup>18</sup> For a detailed account of the development of grounded theory, see Charmaz (2000).

### 3.1.4 Exploratory case studies

When conducting empirical research, the right choice of research strategy represents a critical success factor. Yin (1994:13) claims that the methodological design has to suit (1) the type of research questions; (2) the extent of control the researcher has over actual behavioral events; and (3) the focus on contemporary or historical phenomena. This section describes the choice of the case study method and its design along the criteria listed above.

#### *Research questions*

Different types of research questions call for different research strategies (Yin 1994:13). For example, Yin argues that questions starting with “who”, “where”, or “how many” favor survey research or archival analysis; whereas questions that begin with “how” or “why” are more likely to employ case studies, histories, or experiments. As the main research question of this study asks, “*How is knowledge shared in DGPs?*”, the choice of case study research seems plausible in the light of these criteria.

#### *Control over events*

Once the type of research questions is assessed as “how”, a further criterion that determines the choice of research strategy is the extent of control the researcher has over relevant behaviors (Yin 1994:13). One extreme is given by experiments, when behavioral events can be manipulated directly, precisely, and systematically by the researcher. The opposite is true for historical analysis, where there is no access or control. Case studies are located somewhere in between these two extremes, as they rely on the analysis of documents and artifacts as well as on observation and interviewing, where informal manipulation can occur. This describes exactly the situation of the field research for this dissertation; hence, Yin’s second criterion for employing a case study design justifies the choice.

### *Temporal focus*

Case study research largely overlaps with historical analysis, but is characterized by two additional sources of evidence; systematic interviewing and direct observation (Yin 1994). The case study is generally preferred for the inquiry of contemporary events in which the relevant behaviors cannot be influenced significantly. Again, this criterion is fulfilled by my research as it investigates current events.

In sum, the field work for this dissertation represents a situation in which case study research has a distinctive advantage, that is to say when “a ‘how’ or ‘why’ question is being asked about a contemporary set of events over which the investigator has little or no control,” (Yin 1994:9). For the purpose of this research, I use Yin’s definition of case study: “A case study is an empirical inquiry that investigates a real-life phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident,” (Yin 1994:13). The method I chose for the case study design is that of an exploratory, multiple-case study: *exploratory*, because I attempt to explore situations in which the studied phenomenon (knowledge sharing) has “no clear, single set of outcomes,” (Yin 1994:15); and *multiple-case study*, because it adds confidence to findings<sup>19</sup> (Miles & Huberman 1994) if a replication logic is followed (Yin 1991). The replication logic implies that cases are selected sequentially, so that they either predict similar results to the cases already selected (literal replication), or produce contrasting results but for predictable reasons (theoretical replication) (Yin 1991).

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<sup>19</sup> This does not necessarily affect the generalizability of findings (Miles & Huberman 1994). See this section below for a discussion of the generalizability issue.

### 3.2 Data collection

This section gives a chronological account of the data collection process and the rationale behind it. I first give an overview of the sampling strategy, and then describe the pilot study, and the four cases that constitute the sample.

The data for this study were collected in the period May 2001 – June 2002 during field research at the sites of four DGPs,<sup>20</sup> and after a follow-up email survey sent to these sites in the beginning of 2003. In the field, I conducted open-ended, semi-structured one-on-one interviews with the key persons involved in each project, using an informal list of questions as interview guidelines.<sup>21</sup> I was also allowed to observe several meetings and explore office buildings, and I took field notes on observations, spending between four and seven full working days at each site. Furthermore, I analyzed documents which I received from the interviewees or through official sources. All interviews were recorded on tape and transcribed, totaling over 700 pages of single-spaced interview transcripts.<sup>22</sup> In addition, throughout the study I kept a research journal, taking notes whenever I came across literature, a presentation, or documentation which I deemed relevant to my research process.

Toward the conclusion of the study, I also conducted a follow-up network survey<sup>23</sup> to gain a better understanding of the knowledge networks in DGPs in terms of relevant actors and task interdependence structures. The response rate was 93%. I analyzed the network data with UCINET (Borgatti, Everett, & Freeman 2002), a software for social network analysis.

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<sup>20</sup> For a detailed description of the cases, see section 3.2.3.

<sup>21</sup> The interview guideline is attached to this thesis in Appendix D.

<sup>22</sup> The codes from these transcripts amounted to over 2,500 pages.

<sup>23</sup> For a sample network survey, see Appendix D.

### *Informed consent*

As it is customary for research involving human subjects in the United States, I asked the respondents of the two US-American cases to sign an informed consent form prior to the interview.<sup>24</sup> The purpose of the signature was threefold, indicating that (1) the respondent had understood the scope, content, and consequences of the study he or she was going to participate in; (2) the respondent had the right to refuse to answer any questions and to cease participation at any time; and (3) all information would be treated confidentially, assuring the respondent anonymity. Some researchers dissuade from requesting a signature prior to the interview because it might negatively affect the willingness to respond, especially if the disclosed content is sensitive (Singer 1978). This was not the case during my field research, as nobody refused participation. However, in one DGP the informed consent form was examined by the legal department, whereupon I was asked to countersign the form.

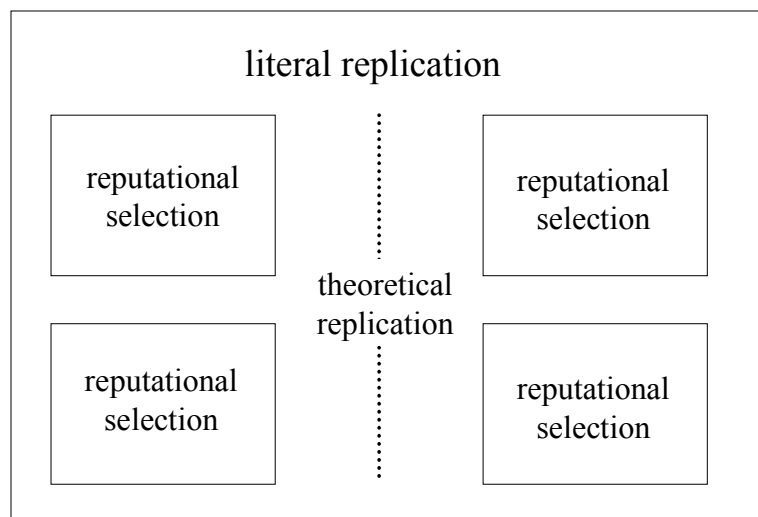
#### **3.2.1 Sampling strategy**

The sample for this study consists of four cases. I selected the sample through theory-driven, progressive sampling; i.e. I chose the cases sequentially based on theoretical rather than statistical considerations (Miles & Huberman 1994). The cases needed to be comparable, which is why I applied a literal replication strategy (Yin 1994) for the sites, selecting them based on the same relevant characteristics over time. The sampling parameters were (1) state-level government agencies in economically

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<sup>24</sup> See Appendix C for a sample informed consent form.

advanced settings with comparable jurisdictions,<sup>25</sup> and (2) a clearly identifiable digital government project. However, I also used a theoretical replication strategy (Yin 1994) by (1) selecting cases in two different countries, Switzerland and the United States of America, assuming an influence of the cultural context on knowledge sharing processes; and (2) by selecting cases in different stages of their project, in order to gain a better understanding of the processes. For the informants, I employed a reputational selection strategy, i.e. the instances were chosen on the recommendation of an “expert” or “key informant” (Goetz & LeCompte 1984). Figure 3-3 gives an overview of the sampling strategy.



*Figure 3-3: Sampling strategy*

As stated in section 3.1.4, multiple-case sampling adds confidence to findings, because looking at a range of similar and contrasting cases may enhance the understanding of a single-case finding. If a finding holds in a determined setting and, given its characteristics, holds in a comparable setting

<sup>25</sup> Switzerland and the United States are both federally organized systems, whose states have their own constitutions and are largely autonomous (cf. Walther 2000). See Appendix B for a graphical overview of the two political systems.

but not in a contrasting case, the finding is more robust (Miles & Huberman 1994). However, the issue of generalization does not essentially change with multiple-case studies, as the generalization occurs from one case to the next based on “a match [...] made to the underlying theory, not to a larger universe,” (Miles & Huberman 1994:29). In this study, the goal is to develop a theory on generic processes, which cannot be extended to the functioning of any government agency, but which can help explain knowledge sharing in other DGPs.<sup>26</sup>

### *Defining the case*

The definition of the unit of analysis is generally determined by the initial research question (Yin 1994). In this dissertation, the unit of analysis is the DGP. I chose to set this boundary to the unit of analysis (as opposed to studying the entire government agency as a case) for reasons of feasibility (see below). Other boundaries of the unit of analysis were determined by the physical location (four specific sites), the social size of the cases (small groups), a determined context (conception and implementation) and process (knowledge sharing) (Miles & Huberman 1994:25).

### **3.2.2 Pilot study**

Conducting a pilot study serves as final preparation for data collection (Yin 1994). I selected the pilot case study according to criteria of convenience, access, and geographical proximity (Yin 1994), which allowed for a less structured and more prolonged relationship between the interviewees and myself than occurred in the actual case studies. Moreover, the pilot case was in a critical phase between conception and implementation

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<sup>26</sup> For a discussion on the validity of the study, see section 3.4.

at the time of my entry into the field, so that I hoped to encounter all relevant issues regarding data collection at this site. Between May and July 2001, I spent several days at the site conducting multiple extended interviews and observing meetings, while being granted access to a variety of data sources and documentation. The focus of the inquiry was very broad, and it covered both methodological and substantive issues. At the time of the pilot study I had not yet decided upon the technologies that I would employ for the final data collection, hence the pilot case deeply influenced the design of my research. In addition, as I conducted the pilot study in parallel with a review of relevant literatures, but prior to the articulation of the dissertation's final theoretical propositions, the pilot case gave me considerable insight into the basic issues that I was studying. For example, it became clear to me that there was a divergence of technical terms that my interviewees and I employed in our communications. My "theoretical" language on knowledge sharing was incompatible with the "practical" language on typical processes in government agencies. Another important insight derived from experiencing communication patterns within and across agencies first-hand; the richness and complexity that emerged from the small sample I was observing guided me to set clear boundaries for the unit of analysis in terms of size and focus.

In sum, the pilot study enabled me to have a clearer view of the requirements that I would be looking for in potential sites. As digital government was one of the pre-eminent topics for governments at the time of the field research for this dissertation<sup>27</sup>, I was confronted with a wide array of cases to choose from. Nonetheless, sites need to be selected carefully for the following reasons (Schatzmann & Strauss 1973):

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<sup>27</sup> See Schedler & Summermatter (2002) for an analysis of the increasing attention to this topic in Switzerland, and West (2002) for an assessment of the state of digital government in the USA.

1. *Suitability* – to determine as precisely as possible whether this site meets the researcher’s substantive requirements. I determined the suitability on the basis of public information available on the sites and of suggestions from faculty who were familiar with the sites;
2. *Feasibility* – to evaluate some of its presenting properties (size, population, complexity, etc.) against the researcher’s resources of time, mobility, and skills. Considerations of feasibility determined the boundaries that I set to the unit of analysis;
3. *Suitable tactics* – to gather information about the place and the people there in preparation for negotiation entry. This was facilitated by the fact that faculty in Switzerland and the United States helped me establish the contacts to the key informants.

### 3.2.3 Description of the cases

The four final cases are outlined below in the order in which they were selected. I describe each case in terms of its location, project initiation, objectives of the project, current state, composition of the DGP group, and the fieldwork conducted (cf. table on page 73).

#### *DGP 1*

The first case, located in the northern part of Switzerland, was launched in 2001, after the state government ordered the state chancellery to explore the situation of DG and to draft a project proposal.<sup>28</sup> The state chancellor appointed a project manager for this task, who then organized a

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<sup>28</sup> The state chancellery is a supporting function to the state government. For an overview of the Swiss and US political systems, see Appendix B.

government-wide retreat, inviting representatives from all agencies as well as other interested parties with previous DG experience to participate. The main result from this retreat was a report to the state government with a DG strategy and action plan, recommending (1) the launch of a portal organized around ‘life events’ (e.g., going to school, getting married, setting up a business); (2) the integration of shared IT infrastructure into a platform; and (3) the incorporation of existing projects: a physical one-stop-shop<sup>29</sup>, an ongoing government reform project, data logistics (a project aiming at the standardization of data handling across different data bases), and the reengineering of business and document processes. The DG strategy recommended keeping a project manager, but did not recommend creating a designated team or otherwise assigning any staff to this position. Therefore, at its conceptual stage, the DGP consists of loosely connected government officials across different agencies that participate in the project on a voluntary basis. The portal launch is envisioned for 2003, in connection with the implementation of 26 partial projects. Upon my entry into the field, I interviewed the then newly appointed project manager and three officials in three different agencies who had all participated in the DG retreat. I returned six months later to conduct two more interviews with new contacts, and a follow-up interview with the project manager.

### *DGP 2*

The second case was located in the north-eastern part of Switzerland. To initiate the project, the state government appointed a cross-agency steering committee and hired a consulting firm to assess the potential of DG in a pre-project as part of ongoing government reforms. The DG strategy

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<sup>29</sup> These branch offices of local government, where citizens gain access to public services in a single location instead of visiting multiple agencies, emerged as a result of public sector reforms and became very popular in German-speaking Europe in the 1990s (cf. Lenk & Klee-Kruse 2000).

resulting from the consultant's report envisioned the following project objectives: (1) Launch of a life events portal; (2) A centrally administered intranet as a backbone for electronic service delivery and internal knowledge management; (3) Optimization of internal processes; and (4) The implementation of 16 partial projects. The report also recommended the creation of a temporary organizational unit for managing the project. At the time of my first visit to the field, I interviewed the project manager, who had just been appointed and was assembling the project team. In a second visit, I conducted interviews with two members of the steering committee (one of them being the individual who had directed the DG initiatives prior to the appointment of the project manager, and the other one serving as a liaison between the overall government reform project and the DGP), as well as with one individual in charge of a pioneering partial project. I also participated in a meeting of the steering committee. Six months later I interviewed the deputy project manager via telephone. In the meantime, the core project team consisted of five members with clearly defined tasks (coordination, strategy, content management, business models, partial projects and harmonization). During the entire period of observation, the project setting had moved from a pre-project primarily administered by the steering committee, to an autonomous project team (which also physically moved into a separate building). The project is currently in its implementation phase, having launched the intranet and having concluded six partial projects at the time of writing.<sup>30</sup> The launch of the portal is planned for the first half of 2003.

### *DGP 3*

The first US-based project, located in the country's north-east, was initiated by the then governor who appointed a public-private task force to develop a strategic plan and implementation roadmap for DG. The report resulting from the joint work of the task force, a steering committee, and five

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<sup>30</sup> Out of 16 partial projects passed by the state government.

policy work groups contained the following objectives: (1) The creation of an intentions-based portal (i. e. a portal that groups services by natural affiliation rather than by government agency); (2) A common IT infrastructure for ‘shared services’, such as electronic payments and a customer relationship management (CRM) program; and (3) The implementation of 27 partial projects. The recommended organizational structure envisaged the creation of a DG project group, which was formed that same year. After the initial planning phase, the steering committee became the portal’s advisory board. At the time of my field research, the project team consisted of a project manager and six core team members: A portal manager, a Webmaster, and four ‘channel managers’, each responsible for the relations with a specific group of stakeholders (citizens, government, business, visitors). I conducted interviews with these seven individuals, and with another person who had directed the strategic efforts in DG before the project manager was hired. The portal was launched in 2002, and the implementation of shared services and partial projects is ongoing.

#### *DGP 4*

The second US-based case was located on the northwestern part of the country. The project originated from various DG initiatives in different agencies when the state legislature appointed a board to explore and coordinate DG initiatives. The board formulated an overall objective of DG, namely the coordination of (decentralized) applications, infrastructure, and policy. Together with an external consultant and partners in various agencies, the state IT department subsequently developed a roadmap for creating a technology infrastructure to support the Internet. The roadmap was the basis for the development of a DG plan. A portal was launched in 2000, focusing on the following areas: (1) The organization around life events; (2) Digital democracy; and (3) An orientation for supporting businesses in the state. A total of nine sub teams worked together on the development of online

services, under a coordinator project affiliated with the IT department. At the time of my field research, the project had been implemented for two years. The focus today is to continue expanding DG applications to state agencies, the hub of it being a DG applications ‘academy’, a live development environment where course participants from different agencies and organizations come together to learn how to build DG applications and how to accelerate the deployment of online services. Some parts of the original DG project have been institutionalized, in the meantime, becoming separate projects (with separate project managers), and the members of the overall DGP are loosely connected.<sup>31</sup> I conducted ten interviews, five of which with the respective project managers, one with the person who had written the DG plan, and four with representatives from different agencies that had implemented a DG initiative.

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<sup>31</sup> Other than the academy, these are (1) application implementation guidelines, (2) IT investment portfolio management, (3) security infrastructure, and (4) public key infrastructure.

Name	Interviews	Location	Project start	Project objectives	Portal launch	Project initiation	Description of project group	Status (2002)
DGP 1	6	CH	2001	Life events portal Integration of IT infrastructure Incorporation of existing projects	2003 (expected)	State government appointed the state secretary to explore the situation of DG in the state and draft a project proposal	Project manager, many loosely connected project members Affiliation: State chancellery	Expanding (conception)
DGP 2	5	CH	2000	Life events portal Intranet Optimization of internal processes Implementation of partial projects	2003 (expected)	State government hired consultant to assess the potential of DG as part of the ongoing government reform	Project manager, core team of four Affiliation: State chancellery	Ongoing (implementation)
DGP 3	8	US	2000	Intentions-based portal Common IT infrastructure Implementation of partial projects	2002	Governor appointed a public-private task force to develop a strategic plan and implementation roadmap	Project manager, core team of five Affiliation: State IT department	Ongoing (implementation)
DGP 4	10	US	1998	Coordination of applications, infrastructure, and policy	2000	Legislature appointed a board to explore and coordinate DG initiatives, which resulted in a roadmap and a strategic plan	Various project managers, members of project group loosely connected Affiliation: State IT department	Established (running)

Table 3-1: Case overview

### 3.3 Data analysis

The data interpretation process was carried out simultaneously with the data collection and a review of relevant literatures. This iterative process, of which the causal model presented in chapter 2 is an intermediate result, is a distinct feature of the grounded theory approach (Glaser & Strauss 1967), and it continued until the completion of the project. The following section discusses this process in more detail.

#### 3.3.1 Grounded theory process

The general work process of grounded theory evolves around the elements of data collection, analysis, and theory formulation. Grounded theory requires that theory is emergent from the data, but does not see these as separate. Data collection, analysis and theory formulation are regarded as reciprocally related, and the approach incorporates explicit procedures to guide this (the ‘doubling back-and-forth’ procedure (Strauss 1987:19), see below). Analysis involves three processes, from which sampling procedures are derived, and which may overlap: *open coding*, where data is broken open to identify relevant categories; *axial coding*, where categories are refined, developed and related; and *selective coding*, where the ‘core category’, or central category that ties all other categories in the theory together, is identified and related to other categories. Data collection is guided by theoretical sampling (Glaser & Strauss 1967), or sampling on the basis of theoretically relevant constructs. This sampling procedure leads to a validation and theoretical saturation of the theoretical work in the study, ensuring that the “data collection is controlled by the emerging theory,” (Strauss 1987:39).

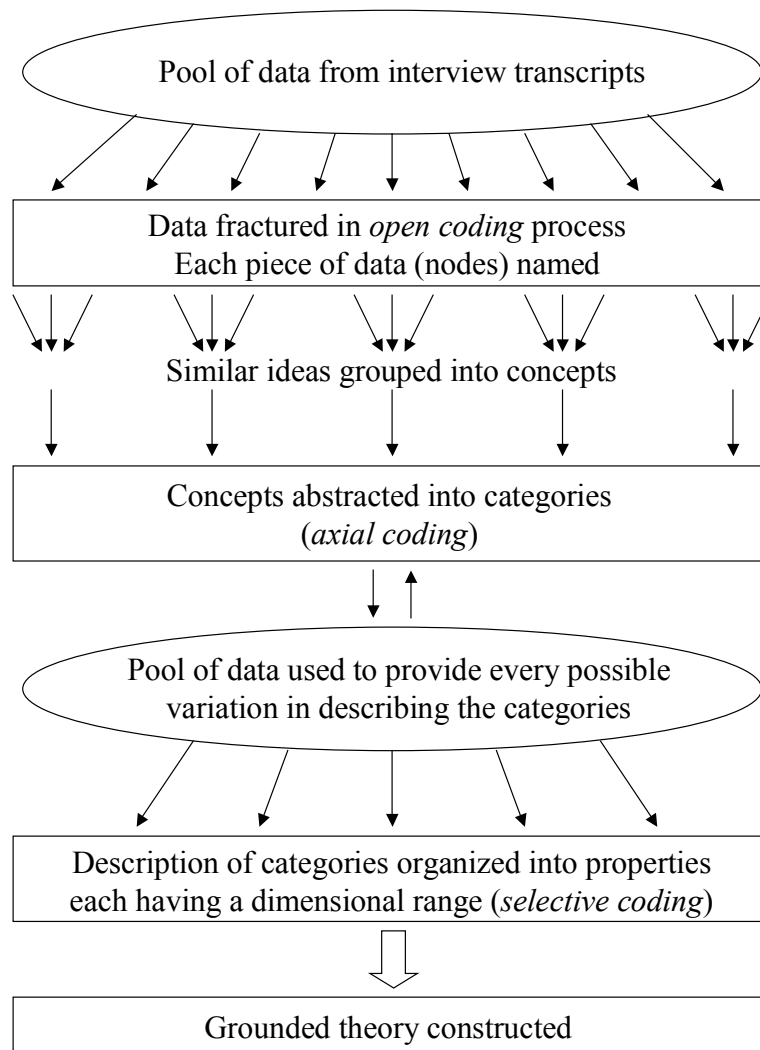


Figure 3-4: Basic work process of grounded theory

In the early stages of a project, open sampling is used to discover and identify data which is relevant to the research question. In later phases, relational or variational sampling is used, either purposive or systematic, to locate data which confirms, elaborates and validates relations between categories or limits their applicability. The final phase of a project involves discriminate sampling, with deliberate and directed selection of data to confirm and verify the core category and the theory as a whole, as well as to

saturate poorly developed categories. Two key procedures, asking questions and making comparisons, are specifically detailed to inform and guide analysis and to aid theorizing. Other procedures, memo writing and the use of diagrams, are also incorporated as essential parts of the analysis, as are procedures for identifying and incorporating interaction and process. An overview of the process is given in figure 3-5.

Strauss (1987) distinguished eight salient features of the work process of grounded theorizing, defining the work process as "... thinking, going to the field, observing, interviewing, note taking, analyzing," (Strauss 1987:17):

1. *Generative questions*: Through close examination and thinking about the data in conjunction with experiential data, generative questions can be raised. These are essential to making distinctions and comparisons between possible hypotheses, concepts and their relationships. The questions I raised are the basis for the literature review in chapter two, which I formulated as a combined result of empirical and experiential data, and an in-depth study of related literatures.
2. *Conceptually dense theory*: The research must make provisional linkages among the created and discovered concepts. This process of linking and coding the concepts yields conceptually dense theory.
3. *Verifying theory*: During the subsequent phases of the research inquiry, the provisional linkages found are constantly re-examined and crosschecked. This leads to a gradual and iterative verification of the preliminary theories discovered. Once provisional theories are derived with regard to the link between modes of knowledge sharing, its coordination mechanisms, and influencing factors, a re-examination of these links is constantly

carried out throughout the research process. This process of ‘going back and forth between data and theory’ prevents theories from being speculative.

4. *Relevance of the coding*: The logical elaboration of dimensions, the drawing of distinctions and the making of linkages must be tied in tightly with the examination and collection of new data. As mentioned above, the shifting between inductive and deductive research, i.e. the constant iteration between theory building and testing, represents a key feature of grounded theorizing.
5. *Integrating dimensions, distinctions and categories*: Integration begins provisionally with the first linking of dimensions and categories. The more the (core) categories can be linked with other relating categories, the tighter the integration becomes. This process is described in detail in chapter four.
6. *Theoretical memos*: During the research project, theoretical ideas should be noted, frequently re-examined, and coded in order to achieve greater scope and conceptual density. I imported my memos into QSR N6<sup>32</sup> and made them an integral part of the analysis process.
7. *Interdependence of data collection, coding and memoing*: This ‘triad of analytic operation’ (Strauss 1987:18) means that the three phases of research are closely connected to each other, e.g. the data collected and the memos taken subsequently undergo coding procedures. Throughout the research process the researcher needs to return to the data collected and analyzed in a

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<sup>32</sup> See section 3.3.3.

prior research stage. This intertwining is referred to as ‘doubling back-and-forth’ procedure (Strauss 1987:19). As described in this chapter, I followed this procedure by carrying out the data interpretation process simultaneously with the data collection and a review of relevant literatures, frequently revising each phase of the research.

8. *Additional integration while writing*: Additional integration of data is needed during the final writing phase of the dissertation. This is necessary in order to fill gaps that have been omitted during the data collection and coding phase. I did this by conducting additional interviews and collecting network data on the four cases during the writing phase, as I realized that I needed some further explanation of the data.

### **3.3.2 The coding paradigm**

In grounded theory methodology, data is coded differently depending on the purpose of the data and the stage of the project. Strauss (1987) defined ‘coding’ as “the general term for conceptualizing data. Thus, coding includes raising questions and giving provisional answers (hypotheses) about categories and about their relations. A code is the term for any product of this analysis (whether category or a relation among two or more categories),” (Strauss 1987:21). According to Strauss (1987:27), “... the excellence of the research rests in large part on the excellence of the coding.” Thus, the coding of data is an essential part of the grounded theory methodology. Glaser (1978) describes five characteristics of data coding: (1) It follows upon and leads to generative questions, (2) It fractures the data, thus freeing the researcher from description and forcing interpretation to higher levels of abstractions, (3) It is the pivotal operation for moving toward the discovery of

a core category or categories, (4) It moves toward ultimate integration of the entire analysis, and (5) It yields the desired conceptual density. The coding paradigm suggested by Strauss (1987), central to all coding procedures, is "... a reminder to code data for relevance to whatever phenomena are referenced by a given category," (Strauss 1987:27), for conditions, interaction among the actors, strategies and tactics, and consequences. The stages of the coding process are detailed below.

### *Open coding*

Open coding is the "process through which concepts are identified and their properties and dimensions are discovered in data," (Strauss & Corbin 1990:101). During open coding, data are broken down into discrete parts, closely examined and compared for similarities or differences. Events, happenings, actions, objects and interactions that are found to be conceptually similar or related are grouped under more abstract concepts termed 'categories'. This close examination of the empirical data allows for a precise differentiation among categories. The overall phase of open coding is in turn divided into the following two sub-phases; (1) Conceptualizing and (2) Categorizing:

1. *Conceptualizing*. In the first sub-phase, empirical observations are selected and labeled by concepts. Data primarily from interview transcripts are broken down into isolated incidents, events and acts, and are subsequently given a name that stands representative for these. These 'names' referred to as codes can either be placed because of the meaning they evoke when examining the data, or directly from the respondents' answers ('in vivo' coding, Glaser & Strauss 1967). Through comparative analysis, similar incidents or events, which share common

characteristics with an object or a happening, are labeled with the same code. In other words, conceptualizing is the process of grouping similar items according to defined properties and giving these items a label, which stands representative for the common link. In conceptualizing, large amounts of data are reduced to smaller, more manageable units of data. I coded the interviews line by line (Charmaz 2000), i.e. the text unit of analysis was represented by one line in a transcript. The initial coding phase resulted in a list of 160 codes. An example of this initial coding phase is given in the table below.

<b>Line #</b>	<b>Interview statement</b>	<b>Line-by-line coding</b>
1023	[He] apparently hired really good people, because they	(F 9) /perceived leadership
1024	have been learning to come to me, because, especially	(F 6) /team formation
1025	since the workgroups – [...], not so much the workgroups we saw	(1 1 2) Communication/with team members
1026	in the phenomenon where I was talking about somebody	(F 62) /focus groups, work groups
1027	who thinks this is a good project is going to send their best people, and other	(F 9) /perceived leadership
1028	people are just going to send people that they can afford to lose.	(F 4) /priorities (F 34) /criticism

*Table 3-2: Example of coding for concepts of an interview statement*

2. *Categorizing.* In the second phase, the codes and concepts found are grouped into more abstract, higher order categories to discover categories from the broad range of data retrieved. This enables the researcher to reduce the number of varying units of analysis being observed. In addition, categories have the potential to explain and to predict, and hence have more analytical power. Once a category is identified, specific properties and dimensions are defined. Through the definition of

properties and dimensions a category is differentiated from other categories and is therefore rendered more precise. The table below shows a first effort of categorizing the concepts, taking into account the causal model described in chapter two. It should be noted though that this initial categorization differs considerably from the final categories (presented in chapter four), due to the continuing analysis process.

(1)	/Interviews
(1 1)	Process
(1 1 1)	/estimation of advancement
(1 1 2)	/understanding of issues
(1 1 3)	/problems
(1 1 4)	/initial position
(1 1 5)	/personal beliefs
(1 2)	Communication
(1 2 1)	/with politicians
(1 2 2)	/with team members
(1 2 3)	/means
(1 2 4)	/internal vs. external
(1 2 5)	/with the public
(1 2 6)	/with non-team members in organization
(1 3)	Social network ties
(1 3 1)	/friendship
(1 3 2)	/advice
(1 3 3)	/affect
(1 4)	Unwritten norms and rules
(1 5)	Meetings
(1 6)	Routines
(1 7)	Group structure
(1 8)	Rules

*Table 3-3: Defining broad categories*

### *Axial coding*

During the process of discovering categories, I assigned and specified properties for each category. The variations of categories along these properties constitute certain patterns and clusters throughout the existing data, and thus build the underlying foundation for theory development. Axial coding is the “process of relating categories to their sub-categories, termed ‘axial’ because coding occurs around the axis of a category, linking categories at the level of properties and dimensions” (Strauss & Corbin 1990:123). The purpose of axial coding is to reassemble data that were fractured during open coding. In axial coding, categories are related to their sub-categories along the lines of their properties and dimensions to form more precise and complete explanations about a phenomenon. The categories that emerged during axial coding are (1) Decisionmaking processes in DGPs, (2) Modes of knowledge sharing in DGPs, (3) Influencing factors of knowledge sharing, and (4) Coordination mechanisms of knowledge.<sup>33</sup>

### *Selective coding*

Selective coding is the “process of integrating and refining the theory derived,” (Strauss & Corbin 1990:143). Categories retrieved during open and axial coding are systematically integrated to form a larger scheme, which constitutes the form of theory. Integration is an ongoing process, which occurs over time and results in the discovering of a core category. By pulling the other categories together to form an explanatory whole, the core category represents the main theme of the study. The selective coding procedure is very similar to the axial coding approach, except for the level of aggregation:

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<sup>33</sup> The detailed categories and sub-categories resulting from axial coding are listed in Appendix E.

in axial coding, the coding paradigm is applied in order to relate categories to sub-categories. In selective coding, the integration takes place between categories and a core category. Once a theoretical scheme has been developed from the coding procedures, the theory derived has to be refined, which consists of reviews for internal consistency and logical gaps. Poorly developed categories are saturated through further theoretical sampling. In this study, I developed four core categories along two task dimensions: (1) Conception and implementation of DGPs, and (2) Exploration and exploitation of knowledge.<sup>34</sup>

### **3.3.3 The qualitative data analysis tool QSR N6**

Using software for qualitative data analysis is not only a matter of personal preference, but a fiercely debated topic among qualitative researchers (Miles & Weitzman 1994; Lonkila 1995; Charmaz 2000). Some scholars are concerned that qualitative programs based on conceptions of grounded theory methods overemphasize coding and undermine nuanced interpretive analysis (Lonkila 1995). Charmaz (2000) adds that computer programs appear more suited for objectivist rather than constructionist grounded theory. In this section, I give an overview of the tool's basic functionality; describe why I chose to use software for analyzing the data, and how it was utilized in my research.

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<sup>34</sup> See Appendix E for a detailed list of the core categories and their sub-categories.

QSR N6 (2002), better known as NUD\*IST,<sup>35</sup> consists of three basic tools: the coders, text search and node search, which operate on two complementary sets of data. Those include: (1) the document system, holding all the documentary data and research notes, as well as memos about these; and (2) the node system, representing all the topics and categories that are important to the research project, and memos of the researchers' ideas on these topics and categories. The two systems are related by coding, i.e. the nodes (topic containers) are used to index passages of related text. Essentially, this is a system of data exploration, leading to the development of increasingly relevant categories of analysis or description, which organize the data. QSR N6 provides ways of helping the researcher develop and relate categories (the nodes) during the process, store ideas about these categories, as well as test, explore and modify these and their coding incrementally, as understanding grows. Particularly useful are two tools, which automatically produce coding, and therefore represent a clear advantage to manual coding. These are Text Search and Node Search:

- *Text Search* looks for passages containing words or phrases the researcher is searching for, and codes those passages as a node. For example, if looking for references to a person or a topic of discussion in the respondents' interviews, it is possible to code the search results as a node for that person or discussion topic. Text search can be restricted in various ways to a specific

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<sup>35</sup> QSR N6 is the sixth version of a product with a long history. Earlier known as NUD\*IST, an acronym for the accurate description of “Non-numerical Unstructured Data Indexing Searching and Theorizing”, it originally worked in scroll mode on time-sharing mainframe computers. It was designed and built by Tom Richards, an Australian computer scientist, for a very large qualitative research project being undertaken by sociologist Lyn Richards in the early 1980's; Universities and other research centers began buying licenses to it in 1987. Subsequent revisions took it to the Macintosh platform, then to PC/Windows platforms (Richards 1999).

document or a set of documents, allowing to conduct within-case analysis e.g. by searching for a topic only in documents coded at case DGP 2.

- *Node search* looks at existing nodes and compares their coding in various ways. The results of its comparisons create new nodes, which can often shed new light on the data. Related searches can be carried out simultaneously by matrix searches. An example of a matrix search is the following: “Find all passages from interviewees in DGP 1 who have said they don't like the way the project is being managed, where they talk about making errors or frustration in the context of hierarchical structure and implementation problems.”<sup>36</sup>

Initially I chose to use QSR N6 primarily for data management purposes. As the material I was gathering increased exponentially during my field research, I found it extremely helpful to be able to store and retrieve these data. Although the developers argue that the program is designed for supporting the emergence of theory by searching the data for codes and assembling ideas (Richards & Richards 1994), theory building obviously has to be carried out by the researcher (Miles & Huberman 1994). I used QSR for coding my interview transcripts, and for analyzing and exploring that coding, but I also tried to gain sense of the whole body of data, not “only their

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<sup>36</sup> Of course, this type of analysis requires that nodes already exist for all the criteria of the comparison, i.e. in this example “DGP 1”, “project management”, “making errors”, “frustration”, “hierarchical structure”, and “implementation problems”.

fragments on the screen,” (Charmaz 2000:521), by always referring to print-outs of the transcripts and physically displaying the data in my work area.<sup>37</sup>

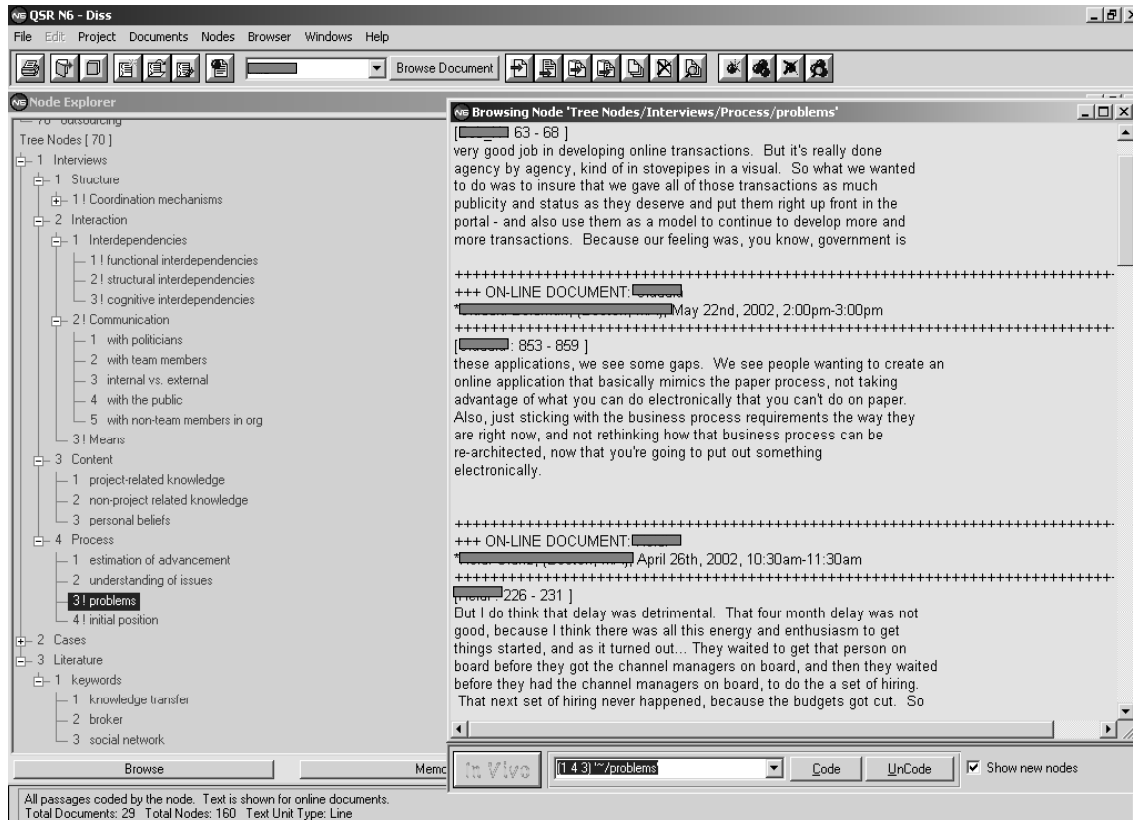


Figure 3-6: Screenshot of project in QSR N6

### 3.3.4 Integrating the literature review in the data analysis

The literature review has long been central to the research process. Traditionally, researchers tend to complete literature reviews as a discrete research phase, which means that the literature review is completed at the

<sup>37</sup> For example, I physically arranged and color-coded entire transcripts; and cut and pasted text passages, rearranging them in various ways over time. This ‘visualization’ of the coding process proved to be very revealing.

outset, becomes shelved and later resurrected in order to reinforce and discuss findings. Hansen & Lavery (2001) suggest using technology to overcome this largely static literature review approach. They argue that software applications can be used to integrate the analysis of empirical data with an analysis of relevant literature, suggesting that researchers review literature throughout their research and enter it into their project as useable data, so that literature citations and keywords can be continuously retrieved along with other data that align with the same analytical category. This means that citations and references to the literature can be linked to findings as they occur and as new literature emerges. As my literature database was quickly growing from around 250 references at the outset of my research project to over 1,250 entries at the time of writing, I began to produce lists of annotated bibliographies according to keywords for easier retrieval. I then imported these lists into QSR N6 and coded them at a node with the corresponding keyword, e.g. 'knowledge broker', in a separate tree called 'literature'. I used a command file for adding references to the node that were entered into the literature database at a later stage. Continuing the example of 'knowledge broker', when examining the text passages I had coded at this node to indicate a person who played that role, the node would also contain all references on the topic from the literature database. In this fashion, the literature became an integral part of my data analysis; as this method allowed me to iteratively retrofit the data with the literature.

### **3.4 Limitations and evaluation criteria**

This section addresses some general limitations attributed to qualitative studies such as this dissertation, and how I tried to contain their influence on my research. I discuss the following issues: subjective bias, abundance of data, intersubjectivity, verification of hypotheses, arbitrary data handling, and

validity. I also list seven evaluation criteria for grounded theory studies as suggested by Strauss & Corbin (1990).

Research cannot be conducted without having a certain *subjective bias*. For example, pre-assumptions already affect the selection of the data sample. Even though grounded theory tries to set principles and rules of thumb, a certain bias on behalf of the researcher cannot be fully avoided (cf. section 3.1.2). In the study, the methodological phases and procedures are thoroughly documented and made transparent in order to reduce this bias. Another limitation is given by the *abundance of data*. The iterative process of going back and forth between data and theory can lead to an enormous amount of data. The study attempts a balanced approach between ‘too much’ and ‘too little’ data.

The exploration of social phenomena is highly complex. Methodologies with a high sensitivity towards these variations in social behavior such as grounded theory cannot fully grant for *intersubjectivity*. The problem of intersubjectivity applies to the study as it does to other research studies focusing on complex social phenomena, be they of quantitative or qualitative nature. However, a limitation specific to qualitative methodologies (and a frequent critique of these) is that there exists no *verification of hypotheses*. Since the “classical” testing of hypotheses employed in quantitative data analysis is not part of grounded theory, the verification of hypotheses is questioned. Even though hypotheses are not quantitatively tested within the data analysis software QSR N6 applied in this study, causal relations between primary components can be derived. Similarly, the chosen methodology bears a risk of *arbitrary data handling*. Since the personal experiential background is a key influencing factor in the phases of collecting, coding and analyzing data, the handling of data is partly perceived as uncontrolled and arbitrary. Similar to the ‘bias’ aspect discussed above, uncontrolled handling of data is minimized by thoroughly keeping record of

the methodological procedures and providing comprehensive documentation thereof. Finally, issues of *validity* are often mentioned as limitations. Since mid-range theories are derived from coding procedures, which in turn are subject to bias and personal experience of the researcher, the validity of data, i.e. proving empirical points of reference for the theories developed, is difficult to achieve. As described above, sources of bias and arbitrariness are minimized as much as possible in the study. In addition, specific criteria suited for the evaluation of qualitative research designs were taken into consideration. These are listed below.

### *Evaluation criteria*

As standards by which quantitative studies are judged are generally not appropriate to qualitative studies (Guba 1981; Kirk & Miller 1986), Strauss & Corbin (1990) suggest evaluation criteria for grounded theory studies (see table below) which take into account the complexity of the social phenomena that are being studied. These criteria reiterate the fact that the purpose of grounded theory "... is to specify the conditions that give rise to specific sets of action/interaction pertaining to a phenomenon and the resulting consequences," (Strauss & Corbin 1990:251), therefore being generalizable to only those specific situations. Often, grounded theory is not adequately reported (Becker 1993). The evaluation criteria serve as guidelines with a dual purpose: They serve the reader, so that he or she can make judgments about the empirical grounding of the research findings, and they serve the researcher as a 'checklist' for the research process.

<b>Criterion</b>	<b>Question</b>	<b>Information needed</b>
#1	Are concepts generated?	How was the original sample selected? What grounds?
#2	Are the concepts systematically related?	What major categories emerged?
#3	Are there many conceptual linkages and are the categories well developed? Do they have conceptual density?	What were some of the events, incidents, actions, and so on (as indicators) that pointed to some of these major categories?
#4	Is much variation built into the theory?	On the basis of what categories did theoretical sampling proceed? That is, how did theoretical formulations guide the data collection? After the theoretical sampling was completed, how representative were these categories?
#5	Are the broader conditions that affect the phenomenon under study built into its explanation?	What were some of the hypotheses pertaining to conceptual relations (i.e. among categories), and on what grounds were they formulated and tested?
#6	Has process been taken into account and to what extent?	Were there instances when hypotheses did not hold up against what was actually seen? How were these discrepancies accounted for? How did they affect the hypotheses?
#7	Do the theoretical findings seem significant and to what extent?	How and why was the core category selected? Was this collection sudden or gradual, difficult or easy? On what grounds were the final analytic decisions made?

*Table 3-4: Evaluation criteria for grounded theory (Strauss & Corbin 1990)*

## 4. Understanding knowledge sharing in DGPs

In this chapter, the findings of my field research are presented. I have chosen a narrative form to communicate the findings, as this technique is particularly suited to convey the richness of values and norms that arises from exploratory case studies (Czarniawska 1997).<sup>38</sup> Since this richness is also expressed in terms of volume, I selected meaningful quotes out of thousands of pages of codes to illustrate the categories that emerged from the data, because I am convinced that nobody could tell the story better than the individuals involved in the projects themselves.

As discussed in chapter two, it is useful to study knowledge sharing in DGPs in terms of its modes, influencing factors, and coordination mechanisms. In the previous chapter, I explained how I analyzed the four projects that are the subject of this study. Open coding of the interview transcripts generated a list of roughly 160 concepts, from which I progressively developed four categories to explain knowledge sharing in DGPs.<sup>39</sup> (1) decisionmaking processes of DGPs; (2) modes of knowledge sharing in DGPs; (3) influencing factors of knowledge sharing; and (4) coordination mechanisms of knowledge. The table below summarizes the categories and their sub-categories in hierarchical order.

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<sup>38</sup> I would like to thank Harrison White for pointing me to Barbara Czarniawska's work.

<sup>39</sup> See Appendix E for a complete list of concepts resulting from open, axial and selective coding.

(1)	/Interviews
(1 1)	Decisionmaking processes of DGPs
(1 1 1)	/motivation for project
(1 1 2)	/objectives
(1 1 3)	/project initiation and process
(1 2)	Modes of knowledge sharing in DGPs
(1 2 1)	/documents and databases
(1 2 2)	/imitation
(1 2 3)	/learning
(1 2 4)	/meetings
(1 3)	Influencing factors of knowledge sharing
(1 3 1)	/motivation
(1 3 2)	/trust
(1 3 3)	/use of IT
(1 3 4)	/culture
(1 4)	Coordination mechanisms of knowledge
(1 4 1)	/hierarchy
(1 4 2)	/social networks
(1 4 3)	/group dynamics

*Table 4-1: Axial coding: Overview of categories*

## 4.1 Decisionmaking processes in DGPs

The first category positions the four cases in their organizational context, tracing the DGP processes from motivation and objectives to the project initiation. It should be noted that the project objectives and initiation process described in chapter three relied on official documents provided by the agencies, whereas the decisionmaking processes reported in this section emerged from coding the interview transcripts, therefore not being biased by political motives.

### 4.1.1 Motivation for the project

The motivation to start a DGP stems from a mix of internal and external factors: initiative, considerations of prestige and location attractiveness, and previous or ongoing reform projects. In all cases, single agencies had started exploring the Internet and related technologies years before the state-wide launch of the project, making suggestions to their superiors on how to employ these new technologies to speed up or otherwise improve their processes. These ‘pioneering’ agencies often had a task-related affinity to technologies, such as the Geographic Information Systems (GIS) office in DGP 1:

We started 30 years ago with the development of big central databases [...]. We dealt with transferring the original analog information into digital format for the past 30 years [...] ... and in the past five years there has been a tremendous increase in possibilities through the Internet, the world wide web...in these past 5 years the possibilities to communicate and distribute our data have increased more than over the past 30 years. [...] Those who are technology-oriented have always been used to the fact that they can’t stand still; they have to move on with the technology.

In most cases, these agencies got the attention of a high-ranking official who believed that there was a potential for new technologies, and who would subsequently call for action. This official endorsement invariably moved the project to a politically visible level, where politicians expected prestige and increased location attractiveness from the project, as this statement from the project manager of DGP 3 shows:

I think it is prestige to a large degree. Quite frankly, if you can demonstrate to citizens, and in particular businesses that this is a friendly state in which to interact with the government, it's going to induce businesses to come here. It will make the quality of life better for the citizens that live here.

On the other hand, in DGP 1 the project manager claimed that politicians were simply motivated by competition with other states:

They probably met a colleague at some official function who told them about the wonderful things they apparently do – and then they came back and said, “Why can’t we do that, too?”

As for the role that previous or ongoing public sector reforms played in the decision to start a state-wide DGP, it should be noted that all four cases had experience with public sector reforms. The salient factors mentioned were that (1) previous reforms had created a climate for change, and that (2) public reforms and DGPs had some goals in common; i.e. efficiency gains and a customer orientation for the delivery of services. In the words of the project manager of DGP 3:

From our perspective in DG, that's going to be an integral part of any public reform. That just makes government more accessible to people, it makes it easier for people to get government services, it makes it more efficient and cost-effective for the government to provide it. I mean, it's just a win-win all the way around. [...] It is a lot like the whole reinventing government thing. I mean, it's not just technology; it's about people and the culture and things like that.

Case	Who	Initiative		How	Prestige, location attractiveness	Public sector reform
		Who	Why			
<b>DGP 1</b>	Head of statistical office		“The state has always been technologically advanced”; “Something needed to be done”	Organized a retreat for government officials, which resulted in a strategy approved by state government	“We believe that making it easy to access [GIS] data contributes a lot to location attractiveness”	“I think that because of NIPM we probably deal better with changes”
<b>DGP 2</b>	Head of government reform project		“There were calls from various agencies to implement electronic processes”	Commissioned a consulting firm to carry out a “pre-project” to test the feasibility of DG initiatives and develop a strategy	“I think it was prestige, but on the other hand a necessity to be a player in this arena”	“I think the DGP would have happened in any case...however, we get generous financial funds through the state’s reform project”
<b>DGP 3</b>	Governor		“The motivation started from the agencies themselves, they were starting to explore this new medium of the internet and the web”	Created a DG task force and steering committee, and commissioned a consulting firm to develop a strategy and roadmap	“I think it is prestige to a large degree. If you can demonstrate that this is a friendly state in which to interact with the government, it’s going to induce businesses to come here”	“From our perspective in DG, that’s going to be an integral part of any public reform”
<b>DGP 4</b>	Governor		“People in [this state] are connected, and their expectations are high”	Hired a senior policy adviser to craft a DG plan	“[They wanted to] ensure that the state remains competitive in attracting business and promoting growth”	“We were in that mindset at that time. A group of us got together in this agency and said, “Let’s think about the future and how do we want to be interacting with our customers.”

Table 4-2: Motivation for the project

### 4.1.2 Objectives

The operational objectives of DGPs, as defined in the strategic plans at the onset of the respective projects, can be grouped into two main categories; (1) development of a state portal, and (2) creation of an enabling IT infrastructure:<sup>40</sup>

The whole thrust of the portal is to provide one face of government, to provide web content and web transactions in a way that doesn't require understanding the structure of government.

Overarching objectives are generally more visionary, pointing in the direction of a transformation of government. Members of more advanced projects soon realized that the creation of a portal and the underlying IT infrastructure would just be the tip of the iceberg of this envisioned transformation:

There was a realization that we couldn't go from status quo today, to transformation of government. What the portal allows us to do is a nice little middle of the road compromise that says, "government is still as messy behind the scenes as it has ever been", but what the portal and web applications allow you to do is make it seem to the end user as if things are a little more rational and a little less siloed. What we were hoping would happen over time is that people within government would then realize, "this makes so much more sense than the way we've been doing it for the past however many years".

The most important visionary objective of DGPs is to provide customer-oriented public services online. The project members in all cases unanimously agree that the primary need of a customer with respect to a government portal is to find the information they are looking for, in the most efficient way possible:

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<sup>40</sup> For more detail, see the case overview in chapter three.

Nobody's coming to our site to be entertained, this is not some cool playground, when they come to the state they're actually probably not in a very good humor, they probably have to pay their taxes or register their car or get child support or some other thing. So they're not going to come and expect little dancing bunnies on your page, and in fact they're apt to get annoyed if you do.

DGP 1, which is the least advanced case, represents an exception in evaluating the importance of customer needs. However, the project manager decided to carry out an online survey “to gain political momentum”. An overview of how each case dealt with customer needs is given in the table below.

	<b>Customer needs</b>	<b>Assessed?</b>	<b>How?</b>
<b>DGP 1</b>	“We know that the customers want to find all information that is related to government on the Internet...there is no need for us to assess that.”	√	Internet survey on DGP website
<b>DGP 2</b>	“The portal is just a first point of entry – we need to enable the customers who are looking for information to find that information.”	√	Focus groups during pre-project
<b>DGP 3</b>	“What we're trying to do at the portal is provide constituents multiple paths to get to the information that they need.”... “A lot of what I'm trying to do on the portal [...] is to provide information to businesses in a way that's intuitive for them, put myself in their shoes...”	√√	“People would call saying, "Where do I call? What's the phone number? How do I get help?" and they compiled all of this information and put it into a Citizens Guide, and over time refined it into various categories.”
<b>DGP 4</b>	“DG was handed off from [IT] to the individual agencies saying, "Okay, we've got the infrastructure built and now it's your turn to build the applications that serve your customers and this is a job that's best done by you because you know what your customers need better than we do.”	√√	“We worked with a group of about 20 subject matter experts from the agencies, and said, "You already know what people call and ask you for; they ask for your email, they call you. What are those 5% of the persistently asked things, over and over again?”

Legend: √ = summarily assessed; √√ = thoroughly assessed

*Table 4-3: Assessment of customer needs*

### 4.1.3 Project initiation and process

In this section, I analyze the initiation of the projects, giving an account of how task forces and work groups came together and prioritized the tasks to be undertaken. I explain the formation of specific groups of individuals appointed to carry out the conception and implementation of the projects, and the role of the IT department and external consultants in the project.

	Members outside government?	What?	Stakeholders represented
<b>DGP 1</b>	—	Retreat, steering committee	<ul style="list-style-type: none"> <li>• Department directors</li> <li>• Individuals with active interest in DG</li> <li>• Agencies considered important for DG</li> <li>• IT department</li> </ul>
<b>DGP 2</b>	—	Steering committee, workshops	<ul style="list-style-type: none"> <li>• Delegates of 3 departments</li> <li>• HR directors</li> <li>• Communications officers</li> <li>• Executive assistants of state secretaries</li> </ul>
<b>DGP 3</b>	√	Steering committee, task force	<ul style="list-style-type: none"> <li>• Agency representatives</li> <li>• Parliament</li> <li>• Academia</li> <li>• Private sector</li> <li>• Citizens</li> <li>• Local government</li> </ul>
<b>DGP 4</b>	√	Retreat, advisory board, work groups	<ul style="list-style-type: none"> <li>• Deputy directors across agencies</li> <li>• CIOs</li> <li>• Parliament</li> <li>• Academia</li> <li>• Private sector</li> </ul>

Legend: √ = present; — = not present

*Table 4-4: Stakeholders represented in task forces and work groups*

Task forces and work groups played a crucial role in all four projects, as they determined the shape each project would take in strategic (vision, strategic plan) as well as in operational terms (definition of partial projects, organizational structure, etc.). The levels and diversity of stakeholders varied across the projects and are summarized in the table above.

The composition of the task force and steering committee raised some criticism in DGP 1: a communications officer complained that information delegates had not been included in the list of invitation. She came to be part of the task force out of her own initiative as one of the ‘individuals with an active interest in DG’, because she believed that the project leader needed to be informed about the existing internet projects in the state. Another individual who had joined the retreat out of his own interest criticized the selection as being biased towards IT:

I said, you couldn't simply do your own little competition – who is part of this jury? Are these the right people? At the moment there are politicians on the steering committee, which has to be that way; and the remaining people are pretty much all from the central IT department. That's not the right approach, that's a misconceived steering committee.

But even in projects where explicit attempts had been made to achieve a balance of stakeholders in the work groups, criticism arose about the skill levels of representatives. A member of DGP 3 described the delegation process as being dependent on the agencies' priorities:

So, I think a lot of times what happens with this type of thing is that you don't always get the right people, you see lots of people. And when a director is told, "Please send a representative from your agency to participate in this work group," now if this work group, if this project is something that is a priority for their agency, then they're going to send somebody good to protect their interests, to further the process, so on and so forth. But for other agencies for whom it was not seen as a core objective, they're going to send somebody they can least - that will hurt

them least if they have to spend a lot of time on the project. So you end up with fairly uneven skill levels within groups like this, and knowledge levels.

### *Roadmaps*

In order to initiate the project, it proved to be important for all cases not only to have a strategy, but also a roadmap, or action plan, outlining the concrete steps to take towards the fulfillment of objectives, particularly those which were more visionary. All roadmaps provided recommendations of what could actually be implemented, however more audacious projects were envisioned in those cases that had stronger political support. All cases started out with a determined number of projects, ranging from 16 to 28 for each case, selected from a larger list of possible initiatives. For example, in DGP 3 a total of 215 DG initiatives had been submitted by agencies, out of which 27 were selected for implementation. The project manager, who at the time was part of the DG task force that compiled the list, described this selection process as follows:

What they really did was they tried to identify each of the two hundred plus opportunities, how many of them really could tap into the shared services. How many people would be using these DG services? They tried to go through a prioritization effort. Then they brought that information to a meeting of all the work groups involved, the leaders of the work groups. And we had a betting process in one four hour marathon meeting where we really tried to identify - all right, let's come to some consensus - we really can't do all two hundred. One of the criteria that went into whether or not a project would be selected was: what was the track record of the agency that was proposing the project? Did they have the staff, and have they demonstrated an ability to get these things done? We didn't want to provide money to an agency that did not have a track record of getting projects completed. We also looked at whether any of these projects had cross-agency potential. That would really be representative of what DG is all about.

### *Team formation*

The decision to form a DGP team – or not to form one – was explicitly mentioned in the strategic plans of three out of four cases. The strategic plan of DGP 1 recommended that the project should be coordinated centrally by one person, envisioning administrative support and a web content manager at a later stage, but no team structure. This position is reflected in the statement of an agency head involved in DGP 1:

I am in favor of trying to organize DG in a way that pushes and supports the efforts in this field, but to raise a parallel organization [for DG]...I think that's simply wrong.

The strategic plans for DGP 2 and DGP 3 contained recommendations on forming dedicated project teams, advice which was followed in both cases. All members of these two teams were recruited especially and exclusively for the DGP, in the case of DGP 2 on a fixed-term basis of 2.5 years. Of particular interest is DGP 4, the most advanced case, where the team was established for a different purpose – to tackle the Y2K problem – and was subsequently redirected to DG, taking advantage of synergies the group had built up in the previous project. The table below describes the formation of the DGP team across the four cases.

	<b>Team formation</b>	<b>Part of strategic plan?</b>
<b>DGP 1</b>	No team, project leader collaborates closely with IT services	Yes
<b>DGP 2</b>	“We had the pre-project carried out by [a consulting firm], the project leader was [the communications officer], and as a result of this project there was a report that already included a definition of the core team.”	Yes
<b>DGP 3</b>	“The concept that we came up with was that we wanted to have four channel managers in place for four of the major channels: government to citizen, government to business, government to municipality, and government to employee/visitor. Two of them were from the private sector. [...] We were looking for folks that had some marketing experience. [...] We wanted people that had portal experience - that had government experience. So when you put all of those factors together, that's what resulted. We also inherited the - what used to be known as the Web Services Group which is led by [the webmaster].”	Yes
<b>DGP 4</b>	“Actually, it was established in support of preparation for Y2K. And when that project basically ended, as the calendar changed, the decision was made - that was a viable, vibrant group, let's refocus it on this work of digital government. So that's how it came into being. [...] It was a group that was formed for a different purpose. That was a great opportunity to continue, to gain the synergy and leverage the synergy between the Deputy Directors.”	No

*Table 4-5: Team formation*

#### **4.1.4 Role of IT department and external consultants**

The role of the IT departments and the level of involvement of consulting firms emerged as important factors for decisionmaking processes in DGPs, influencing the balance between technological and strategic aspects in the case of the IT departments, and, with respect to the involvement of consulting firms, determining the extent to which external analysis contributed to the conception of the projects. These two factors are summarized in the table on page 104.

### *Role of IT department*

Whereas the two US projects, DGP 3 and DGP 4, were launched from the IT state agencies, in both Swiss cases the central IT agencies had been dissolved several years prior to the project. It had been decided to affiliate DGP 1 and DGP 2 with the respective state chancelleries, a supporting (line) function to the state government considered a neutral position within the government.

In the case of DGP 1, the IT department had been decentralized, however, according to one member of the GIS office, the government soon realized that this situation was problematic. To resolve the lack of technological coordination that arose, an IT board was created, consisting of representatives of all departments, with the task to advise state government, but without formal powers. The members of this advisory board had been among the strongest advocates for a state-wide DG initiative, and when the state hired a person to be in charge of DG, not surprisingly these board members were very active in promoting the technical aspects of DG, convincing the new project manager of the preeminence of IT over strategic considerations.

In DGP 2 the state IT agency had been outsourced, an action that provoked mixed feelings with the members of the DGP team. One member complained about the fact that the outsourcing had not been prepared adequately, “leaving everybody to their own devices”, but not providing the necessary conditions to guarantee a functioning exchange across the state government. Another member was more positive, seeing this freedom of action with respect to IT choices as an opportunity for exercising more influence on the infrastructure; however, she also criticized the preparatory work, forcing the DGP team to take care of “fundamental infrastructure issues” that apparently had been neglected, such as an emphasis on security. Nonetheless, being financed by the state’s government reform project, the

DGP is clearly not dominated by IT. The conceptual phase was headed by the state's communications director, who had explicitly excluded representatives from IT in the pre-project:

The IT people in particular, they felt excluded in the pre-project; and I told them, please don't feel rebuffed, but I don't want you in the pre-project, because with all our ideas...they have to float freely first, and if you immediately intervene by saying, "that's impossible to implement", you'll nip it in the bud – that doesn't mean that we don't want to listen to you, but we need to generate ideas first...

One might assume that due to their affiliation with the IT department, technological aspects would dominate DGP 3 and DGP 4. However, this proved not to be the case since (1) a large variety of stakeholders had been involved in the conception of the project, and (2) the people who continue to work on the project are predominantly non-technical or possess multidisciplinary skills.

	<b>DGP 1</b>	<b>DGP 2</b>	<b>DGP 3</b>	<b>DGP 4</b>
<b>IT department</b>				
• <b>Position</b>	Decentralized	Outsourced	State agency	State agency
• <b>Role</b>	IT dominates strategy	Strategy dominates IT	Balanced	Balanced
<b>Consultants</b>				
• <b>Position</b>	Moderate	Strong	Strong	Moderate
• <b>Role</b>	Two firms commissioned to craft a report of retreat	Developed strategic plan in collaboration with steering committee	Developed strategic plan in collaboration with task force and steering committee	Analyzed infrastructure of IT department and customer agencies

*Table 4-6: Roles of IT department and external consultants*

### *Role of consultants*

It has become very common for governments to hire consultants, and the major consulting firms have considerably expanded their activities in the public sector. Consulting contracts range from fairly small tasks, such as carrying out a survey for a single agency, to important interventions, such as restructuring or reengineering measures. One individual of DGP 3 summarized the reasons for hiring consultants in government:

Well, I think that it just makes sense for government to avail themselves of people whose sole role is to spend time in research. You know, government employees have jobs to do, they don't necessarily have the time to be going out and taking a broad view of what's going on in the rest of the world, what makes sense for direction. I don't think that in any case a state government should hire a vendor to say, "Go here", they need to determine their own goals. But it's proven very effective to have vendors in to help you to actually develop those goals and work on them and get projects moving.

In the cases that are being studied here, all had relied on professional consulting services, varying in intervention time and depth. DGP 1 hired a consultant who moderated the retreat and crafted a report of that retreat, but the project manager alone wrote the strategic plan. It is envisioned that a consultant is hired to present the DGP to a broader public at a later stage of the project. Two projects (DGP 2 and DGP 3) chose to have a strong collaborative relationship with a consulting firm, selecting the firm on the basis of work it had performed in other states that had demonstrated a high level of interaction between consultants and government officials, while leaving the ownership of the project with the government. DGP 4 hired a consultant at the beginning of the project to analyze the infrastructure of the IT department and how it connected to the customer agencies. This work resulted in the strategic plan, which was written in-house.

## 4.2 Modes of knowledge sharing in DGPs

The second category emerging from the data answers the operational aspect of the main research question of this study; i.e. how is knowledge shared in DGPs? In this section, I discuss the following four modes of knowledge sharing: (1) Documents and databases, (2) Imitation, (3) Learning, and (4) Meetings.

### 4.2.1 Documents and databases

Because of the traditional functioning of bureaucracy, one might reasonably assume that knowledge storage and retrieval through documents and databases plays a central role in DGPs. And indeed, this is the case – however, attention needs to be paid to the distinction between information and knowledge, a sharp delineation that individuals in all projects made in terms of usefulness. For example, all DGPs have intranets and access possibilities to databases, and they are used to retrieve routine information. But because in most cases the tasks require complex knowledge rather than routine information, “...people read or write something, then they call or meet somebody to discuss it”. Years ago, in DGP 3 there had been a (failed) attempt to build a knowledge database:

One of the things that my boss actually wanted to do is start building a knowledge management database, so that when people get phone calls, regardless of what agency does the phone call, there is a knowledge management database that they can refer to be able to better help point that customer in the right direction. That hasn't happened. Part of it was a funding issue also - those packages are very, very expensive - so we just didn't go there.

However, at present a project is being implemented on the internal website which takes a similar direction, enabling government employees to

put information on the website about active projects – their status, who is involved, who the contact people are, and what the timeline is.

Another knowledge sharing instrument employed is that of manuals, or standard operational procedures, such as in DGP 2, where the team was initially hired for a fixed period of 2.5 years, currently exploring ways to let the knowledge accumulated in the team flow back into the government:

Our goal is to [document] the entire output that is related to IT systems, be it the intranet, the partial projects, or the portal; [...] to have created manuals which don't leave any questions unanswered regarding how they originated, who bears which responsibilities, and who administrates it. So, it is our goal to take this operational knowledge back into the government.

#### **4.2.2 Imitation**

As asserted before, digital government is a governance mode that challenges the traditional functioning of government in many ways. This is particularly evident with regard to “looking over the fence”, or monitoring and copying the practices of other agencies and governments. Of course agencies have compared themselves to other agencies before, but the Internet offers a whole new range of possibilities for replications the work of others – at least to a certain extent – because of the very nature of the World Wide Web. Replication from other agencies involves knowledge transfer rather than sharing, and is often regarded as an effective effort to avoid “reinventing the wheel”, as has been repeatedly stated by members of all projects. A member of DGP 3 gives an example:

I would say a lot of [my work] is plagiarizing and relying on other people's, other agencies' websites, sometimes doing a lot of hard work and wading through their online or print publications, pulling out what it is the business needs, and presenting it in a user-friendly way.

Imitation is mostly encouraged by the “imitated” agencies, especially if given credit for, since it promotes the image of the duplicated website:

We certainly do communicate with agencies by email, just letting them know what our efforts are. We go out on the speaking circuit and speak to [...] explain what the portal is all about [...]. You know, we do agency presentations.

DGPs often serve as a hub for diffusing best practices among the agencies, as stated members of all projects. For example, a member of DGP 3 said:

We had to look for best practices, and then share those best practices across the enterprise. It doesn't make sense for one agency to have developed an expertise and not share that expertise across several different agencies that might have similar missions.

### **4.2.3 Learning**

I was surprised by the high level of learning activities I encountered both within and across DGPs. Learning occurs through a variety of processes at the individual and organizational level. Three major processes emerged with regard to DGPs, presented in the order of rising task complexity: (1) Trial and error, (2) Exchange with other agencies, and (3) Collaboration.

The first process, trial and error, refers to “learning by doing”. As the project manager of DGP 4 affirmed:

The key to what we do is, we try to take a very practical approach and to learn by doing. And the only way you really find out what the issues are is to go get into it.

A member of DGP 2 recounts that much was learned during the process on a step-by-step basis, the situation encountered at the beginning

being different from what had been expected (in terms of prerequisites). Only over time it became clear what was missing, and what else could be useful. This process might sound trivial at first, but considering the fear of failure that often characterizes government employees, it actually is remarkable. The communications director of DGP 2 accounted for fear of failure in the following way:

The fear [of government employees] of doing something in a way less than perfect primarily exists toward the outside world. Generally, the way it works in government is that when government makes a mistake, you can read about it in the papers the following day. This, in my view, is the predominant fear of government employees.

Managers had to fight this fear at all levels, in one case carefully trying to establish a culture of ‘courage to compromise’, because ‘there are no perfect decisions’ (DGP 4).

The second process that emerged is the exchange with other agencies. As I put forward in the previous section, the Internet facilitates duplication of what are considered best practices. However, mere replication is not sufficient for successful implementation, no matter how successful the original practice might be. What makes it successful is the exchange with other agencies. In this context, exchange is similar to collaboration, but different in that it is less concrete than collaboration. A member of DGP 4 gives an example:

[Other states] call us up about a particular issue or we'll call them up: "How did you do this?" "What was the focus?" "What vendor did you work with?" "What did you learn in the process that we might benefit from?" "What's your best practice in this area? We're getting started in a new area." We do that all the time.

Collaboration, the third process of learning, can be viewed as... “A confederation of all the organizations working together, with a common enterprise perspective” (DGP 4). In DGP 4, learning through collaboration has been institutionalized in the DG “academy”:

What we do is, we started off with the template approach, where we bring a bunch of agencies together that care a common technical service like printing, or licensing, or that kind of thing. And we'll bring them together, that's kind of a community of interest, agencies that have a similar business process, and we'll decide to build a new class of services like a licensing application, a new class of online services like online licensing or online permitting, or some of those things.

At a less sophisticated level, members of DGP 2 and DGP 3 recounted mutual learning through collaboration, as told by a channel manager of DGP 3:

I think all of us rely on feedback and assistance from a great number of people, in determining what makes the most sense to put out there on our channels. And in particular, with the municipal channel we've really tried to involve the cities and towns, because one thing that I've learned in 25 years in public government, nothing annoys them more than being told, "I'm from the state, and this is what you need."

#### **4.2.4 Meetings**

Meetings of involved parties proved to be the most effective way to share knowledge in all projects during the conceptual phase. A plausible reason for this might be the generally assessed preference by government officials for face-to-face contact. It is through the meetings of task forces, work groups, and steering committees that the project ideas were generated, refined, and brought towards implementation. In DGP 2, the deputy director organized an “e-project-lunch”, a monthly networking event where managers

of partial projects would listen to a speaker on some relevant topic and subsequently have the occasion to share experiences, views, and questions with peers.

The meeting frequency of important parties in the conceptual phase (task forces, work groups, and steering committees) decreased significantly when projects entered the implementation phase, as told by a channel manager of DGP 3, who is now meeting with small, focused groups of stakeholders:

Until very recently we were meeting a lot face to face. You know, once this area was launched, they stopped the frequent meetings, and now what I'm doing instead is tending to meet with people one-on-one or small groups, to focus on a particular area, as opposed to the broad realm of the municipal channel.

In DGP 2, the meetings of the steering committee have been temporarily suspended because they were deemed unnecessary at the present stage:

We haven't had any steering committee meetings in a while, for the simple reason that people didn't feel responsible anymore, and also because they didn't invest the time necessary to prepare for the meetings. In addition, when the steering committee was originally formed, the idea behind it was to have a contact person in each department, who would carry the project out to his department. This task is now mainly done by the managers of partial projects, and by those folks who are in charge of harmonizing the websites.

### **4.3 Influencing factors of knowledge sharing**

As I have stated previously, intangible assets such as knowledge are difficult to articulate. What determines whether individuals share knowledge, to what extent they share it, and how that relates to the recipient's understanding of knowledge, are factors subject to the researcher's interpretation. Consequently, for this section I relied on the literature more than I did in other parts of this chapter, as guidance to an interpretation of what I observed. With this caveat in mind, the main factors found to influence knowledge sharing in DGPs were (1) Motivation, (2) Trust, (3) Use of IT, and (4) Culture.

#### **4.3.1 Motivation**

Motivation influences knowledge sharing at individual, group, or organizational level, depending on the theoretical lens one adopts. I used Osterloh & Frey's (2000) distinction between intrinsic and extrinsic motivation to analyze individual and group motivation.

Not surprisingly, personal motivation played a preeminent role in getting involved in DG initiatives. The table below gives some sample statements which are ordered according cases, but similar statements occurred in all four projects. In sum, as an individual of DGP 4 remarked, "everybody is motivated by different things", but overall a good working climate appeared to be the key to personal motivation.

<b>DGP 1</b>	“I participated in [this DG initiative], because it has been a personal hobby for me; actually I have to say that this is the first time that I kind of brought this into my job. I started working with new technologies eight years ago, and I have been fascinated with the topic ever since.”
<b>DGP 2</b>	“I find it very satisfying that in the three years that I have held this position [as communications director] the communication has notably improved.” ... “What can I say, I really enjoy working on this project.” [deputy director]
<b>DGP 3</b>	“I’ve worked in government for some 20 years, and really what drives me is to ... I mean, there are a lot of good things that go on in government, and I’m driven by the fact that I want to demonstrate to folks that dealing with government is not what it used to be. It can be a customer-satisfying experience. We do have very talented individuals, you know, focusing everybody.”
<b>DGP 4</b>	“Everybody is motivated by different things. That’s sort of a personal situation. The people in our group that [do customer support], they get jazzed when the statistics are climbing and they get good feedback or they’re able to solve a problem that existed when a constituent called and said, “I have this odd configuration. This old browser with this platform and I am having trouble getting help to figure it out.” I mean, they get a lot of true pleasure in their work by being able to fix those kinds of problems.”

*Table 4-7: Examples for personal motivation*

Extrinsic motivation is manifested through incentives to share knowledge. The three major incentives - observed mainly in the US cases - were (1) Shared services, (2) Ownership, and (3) Performance.

Shared services refer to services which concern more than one agency. The incentive lies in the central funding of shared services, making it easier for DGP teams to convince agencies to participate because of the positive financial consequences of doing so. Shared services were employed as incentives chiefly in DGP 3:

So how do you start breaking through all that and creating new structures that allow people to cut across those barriers? One of the ways we've been able to do it, in a funding kind of way is through these bonds, because they are coordinated by a central agency, [IT], and we can then say to agencies: "Okay, if you want to do this project and you want to do that project and they are very similar projects, they serve the same constituent group, get together and figure out how you're going to do this together, and we will

fund you, you figure out who's going to be the lead agency, figure out who's going to be the overall project manager, and we'll fund that project, but it will result in an integrated application, it won't result in two siloed applications." So having the control mechanism that funding gives you, is very important.

Out of the four cases, DGP 4 was the one that emphasized incentives most fervently. In fact, the latter two incentives, ownership and performance, are part of the project's philosophy. Regarding ownership as an incentive to share knowledge, the project manager of DGP 4 affirmed:

One of our principles [...] is that ownership is everything. If people contribute to anything, whether it's to building an applications or whether it's developing a policy, if they contribute to it and they see their own ideas and they saw the idea emerge and they know why it's this way and not that way, they'll own it. But if you just serve it up and say, "Here you go!", it's not going to go anywhere.

Another characteristic of DGP 4 that is interesting in terms of incentives is a so-called 'performance agreement' for DG initiatives. This agreement is made between an agency director and the governor, and it lays out a set of priorities for the agency that apparently has a motivating effect on the agencies involved, as the project manager of DGP 4 stated:

It becomes a real driving force throughout the organization, not just at the top level. I mean, I see it in our own teams within our own agency. I mean people, when their name is by a project and there's a commitment in that Performance Agreement, they take a personal responsibility to make sure things are done and barriers are knocked down and issues are resolved so they can not have to report late that they didn't make the quarterly numbers or the objectives.

### 4.3.2 Trust

The fact that trust is a necessary condition for sharing tacit knowledge does not come as a novelty to social psychologists. Trust was mentioned mostly in connection with overcoming ‘turf barriers’, as an individual in DGP 3 described:

Sometimes what you need to do, especially when you're talking about breaking down turf barriers, is that you need to develop a certain level of trust in the group before they can even get to the step of contemplating how they're going to work with each other.

An individual in DGP 1 asserted that trust was related to the means of communication, expressing his feeling that “technology will never replace a face-to-face meeting”, which he deemed particularly important for the implementation of a DG initiative, as such a project generally spans across different functions, therefore demanding “a certain kind of basic trust, a consensus on which direction one is going to take”.

On the other hand, the *lack* of trust plays an important role in knowledge sharing, as feeling threatened in some ways by the coordinating agency or a superior emerged to be a fairly common issue across cases. An individual in DGP 3 put it this way:

[I do] a lot of ego stroking type activities. [...] You go and you take something away from somebody. Then you have to be sure of how they perceive. Are you taking it away because you think I'm incompetent? Or because you're trying to take over my territory? There's a lot of turf type issues involved. We just have to be really cognizant of them when you present these things.

### 4.3.3 Use of IT

The claim made by some communication theorists that the use of IT only marginally affects the means of communication employed for sharing tacit knowledge (cf. Orlikowski & Yates 1994) was confirmed by the observations of the four cases. As I have mentioned before, individuals in all projects reported on the use of different means of communication according to the communication content. Email has become the primary mode of communication “for easy matters that are not considered urgent” (DGP 1), but when something more complex comes up, most individuals prefer a phone call or, if possible, a face-to-face meeting

The use of IT is clearly related to the notion of in its effects on knowledge sharing. On the one hand, there is “fear of failure and fear of the unknown” (DGP 4), on the other hand, IT specialists feel threatened by the overall increase in the knowledge of technology, fearing “that they have to give something away” (DGP 2).

Another observation worthwhile mentioning is the *lack* of use of some existing technologies. For example, both Swiss cases have a state-wide records management that is coupled with an e-mail system. A member of DGP 1 explained the system at length, pointing out its many possibilities and advantages, to then conclude:

The technology is there [...], it's a state-wide system, but it's not being used, because probably nobody knows that it works this way...

#### 4.3.4 Culture

As I have argued previously, culture is deeply linked to knowledge in that both are intangible assets, and their influence is mutual; culture forming knowledge, and knowledge forming culture. Consistent with my discussion of other intangible assets in this study, once more I point to the difficulties that I experienced when attempting to distill such a rich concept into a few paragraphs. It could be argued that this whole study is about culture, touching three levels – groups, organizations, and nations – and therefore there is no need to add a section on a topic that is deeply embedded in this study. On the other hand, there are some salient characteristics worth mentioning which have not been explicitly stated elsewhere in this study, and which generally distinguish the Swiss from the US cases. These are listed below, moving from a micro to a macro level:

- *Coffee breaks.* In the Swiss agencies it is customary to have “institutionalized” 15-minute coffee breaks twice daily, where co-workers in the same building or division come together.
- *Closed doors.* Office doors are generally closed in Swiss agencies. This circumstance is partly due to the architecture of historical buildings, where agencies often reside; but I felt a strong difference in the atmosphere when walking into a US agency with open office spaces.
- *Calling co-workers by their last name.* The Swiss way of interacting with co-workers is remarkably more formal than in the US cases. This is consonant with a generally observable higher attachment to rules.
- *Customer orientation.* Although claimed to be the objective of DG initiatives in both countries, customer orientation is far more anchored in the US culture than is the case in Switzerland. One consequence of this is that citizens and businesses have higher expectations in terms of

government services in the US; another consequence, which certainly requires a more in-depth inquiry, is a claim made by some public managers in Switzerland, i.e. that the US DG initiatives have a comparative advantage with respect to the project implementation, because they do not need to invest as many resources into changing the attitudes of government workers toward customer orientation.

#### **4.4 Coordination mechanisms of knowledge**

This section discusses the three coordination mechanisms for knowledge sharing found to exist concurrently in the four cases; hierarchy, social networks, and group dynamics. As would be intuitive to assume, hierarchical reporting structures, and especially power and authority, had a strong influence on knowledge sharing in DGPs. However, the effects of social network relationships emerged as being extremely powerful, oftentimes overruling the given hierarchical structures. As could be expected, group dynamics had a lesser effect on cross-agency knowledge sharing, but they significantly shaped the advancement of DGP processes.

##### **4.4.1 Hierarchy**

As discussed in chapter two, whereas the traditional understanding of hierarchies is that decisions are made top-down and reporting is made bottom-up, DGPs require collaborative structures of decisionmaking, both within and across agencies. This tension between existing and required communication structures was a predominant topic for all DGPs in this study. For example, the web master of DGP 3 explained the difficulties of communicating bottom-up with respect to suggestions for improvement:

A lot of it is because we're working with people who have a job, they have a boss, their boss ultimately is the commissioner of their agency, whose concerns are their goals and objectives, mandates from the legislature or from the governor's office, and for the webmaster down here at the bottom of the pile to say, "Hey, we should do this", just either never makes it to the top, or is just not a priority at the top.

On the other hand, individuals across cases stated the importance of referring to rules as a tool for reinforcing the adherence of agencies to the project, therefore availing themselves of the hierarchical power structure:

There are agencies that said, "Look, gee, we've invested in our own marketing, we don't want to confuse it with yours." In those cases we had to be a little more strong in our communication and our sales pitch and say, "look, we've already decided at the highest level of government, this is an enterprise-wide initiative, you need to put aside your desire to market your own agency and join the team."

In even stronger terms, a member of DGP 2 claimed that turning rules into regulations was "the only possibility to achieve something in government", which is why they elaborated a link policy that subsequently was submitted to parliament for ratification, thus obliging all agencies to adopt the policy. This claim was only partially confirmed by a member of DGP 3, who stated that agencies can be "convinced" to participate in cross-agency collaborations, for example by leveraging budget pressure:

So when there's no money and you say, "You can't afford to do that, unless you use the shared service that we're putting in, and if you follow our rules", well then they follow the rules so they can get the money, but not because - because the basic nature of things is still they get an edict from the governor or from the legislature, and that establishes the priority for that agency, and those edicts have nothing to do with cooperating with other agencies.

Overall, the most effective mechanism for convincing agencies to participate and therefore to make a DGP successful was *executive sponsorship* (a term used in DGP 4), or “direction and commitment from the very top levels of government”, as one senior member of DGP 3 stated:

The problem that we find is that government is still organized the way government is organized, it's very hierarchical, so that if you don't get buy-in at the top level, where the agency heads are talking to each other and say, "yes, our teams are going to work together and are going to share this application", it's not going to happen. It's just not going to happen. [But] when you have the governor or you have the [secretary of a department] at a cabinet meeting talk about, "this secretary and this secretary need to work together to create this DG application", that's as important as the worker bee level is, because that gives the legitimacy to those worker bee people to work with each other.

In DGP 4, the project manager stated that “...executive sponsorship brings priorities and it brings resources”. The governor holds agency directors accountable in a performance contract, creating a commitment on the part of the agencies to put a certain number of services online.

### *Overcoming stovepipes: Integration and aggregation*

A major challenge for all projects proved to be the overcoming of existing ‘stovepipes’, or the inability to communicate across functional divisions and organizational boundaries. With the objective in mind to present a one-stop government to the citizens, the DGPs found themselves in a position where they attempted to bridge the gaps that exist between current online transactions, which mainly followed the traditional agency-by-agency approach. An individual from strategic planning in DGP 3 explained this challenge by saying:

I think that one of the challenges with DG from the very beginning [...] is that there are no mechanisms, there are no organizational structures that foster cross-agency collaboration and integration. Budgets are agency-specific, line-item specific<sup>41</sup>, and statutes and regulations are agency-specific. There are statutes and regulations that actually prohibit data sharing across agencies, probably for a lot of good reasons but sometimes for not-very-good reasons, just because of territoriality. [...] So that's the constant struggle, just how to get that horizontal view when everything is pointing to a very vertical view.

The communications officer in DGP 2 put a personal effort into bridging the boundaries between agencies by creating “internal information structures”, convincing the government that each department appoint an information delegate, and arranging regular meetings with them. However, individuals in all four projects stated that the integration of agencies across government runs against the interest of many agencies, who “actively try to keep their own system running and fend everything that might challenge *their* hierarchy and *their* right to exist”, as expressed by one member of DGP 2. This “entrenched interest in keeping the bureaucracy the way it is” was one of the reasons in DGP 3 to centrally coordinate the DGP:

[...] Because the agencies were part of the problem - they were all providing their own narrow little piece of information, and it wasn't being tied together. [...] In order to achieve the goal of an intentions-based website, one face of government, it's not going to be done in a decentralized fashion. Basically, [the portal] is one big centralization effort, even though we like to talk about decentralized content management.

The approach of “centralized decentralization” of DG initiatives, as it is called in DGP 1, denoting that initiatives are generated in a decentralized fashion (i.e. in the agencies), but coordinated centrally, is (or was) generally

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<sup>41</sup> This is not true for the Swiss cases, where one-line budgets have been adopted in the course of NPM projects (cf. Schedler 1998).

followed by all four projects. In the case of DGP 4, the most advanced project, the central coordination was relaxed somewhat, delegating the responsibility for the applications to the agencies themselves. Each agency is now responsible for the development and deployment of online services, having the legislative authority to deliver those services and collect the necessary data.

#### **4.4.2 Social networks**

As anticipated earlier in this chapter, social network relationships emerged as being extremely powerful, oftentimes overruling the given hierarchical structures. In this section, I describe the social networks of the four DGPs with regard to their structure and content.

In all four projects, individuals relied on informal networks within and across agencies on a daily basis. As an individual explained to me in DGP 3, retrieving information through informal channels is considered normal practice in government:

The first thing you do when you're looking for something is get on the phone and start calling around. [...] It's just a matter of, once you got the right person, to get them to give you this information you're looking for. From that perspective, having built personal rapport really goes a long way, if they know you they're more likely to help you, [...] if you have personal relationships established, you're more likely to get results....

From a process view, DGPs can be divided into two major phases; conception and implementation of a project. These phases are reflected in the social networks of the projects. Before attempting to justify this claim, it is useful to recall that the four projects find themselves in different stages of implementation; DGP 1 currently being in a conceptual phase, DGP 2 and DGP 3 having recently entered the implementation phase, and DGP 4, having

implemented a large part of the applications envisioned in the strategic plan<sup>42</sup>. Many social networks came into existence during the conceptual phase of the projects, where people from different agencies and interest groups came together to jointly consider DG. For example, a channel manager from DGP 3 stated:

From that whole process of those access channel workgroups, I got to know more people, and became more familiar with their content, information on their sites and things like that. So now that the workgroup period is completed, [...] I talk to and follow up with people, and kind of check in with them, take requests, follow up on requests.

The project director of DGP 2, who was hired from the private sector to manage the project, stated that he socialized with representatives from the agencies through the (centrally coordinated) conception of their partial projects. The deputy director of DGP 2 explained how the launch of the Intranet was conceived as a way of casting a net of contacts across agencies, encouraging people to share their needs and give their input. As recounted in the previous section, she also explicitly promoted the creation of networks by introducing a monthly networking event for managers of partial projects. Similar stories can be told about the other projects, with the common denominator that most of the individuals involved were surprised by how conceptual meetings brought together so many like-minded people for the first time.

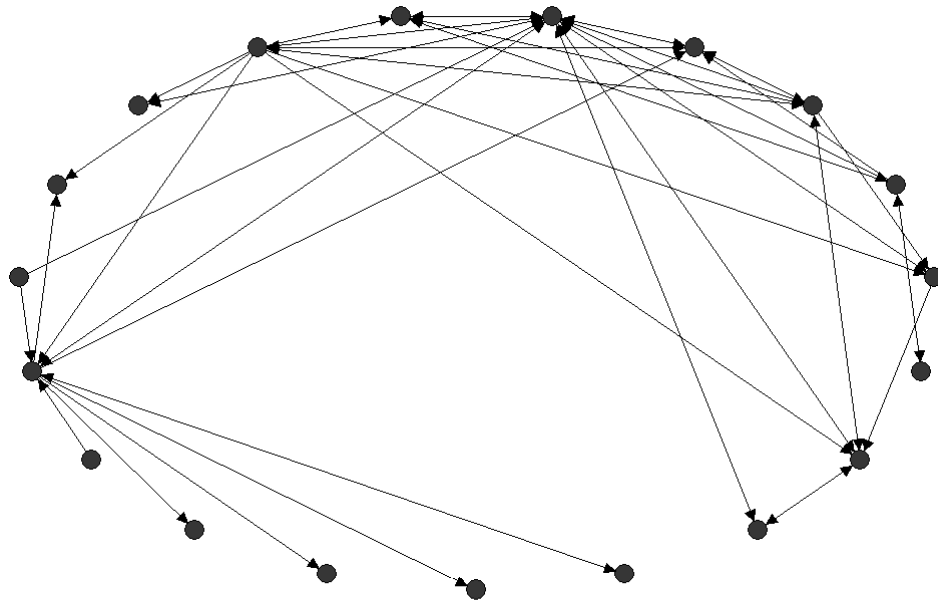
These stories pushed me to study the informal networks more rigorously as I was writing up the results of my fieldwork. I therefore asked all interviewees in a questionnaire to whom they give information and from whom they receive information relating to their project, letting them choose from a list of names which had arisen during the interviews, in addition to all the interviewees from each project. Furthermore, they had the possibility to

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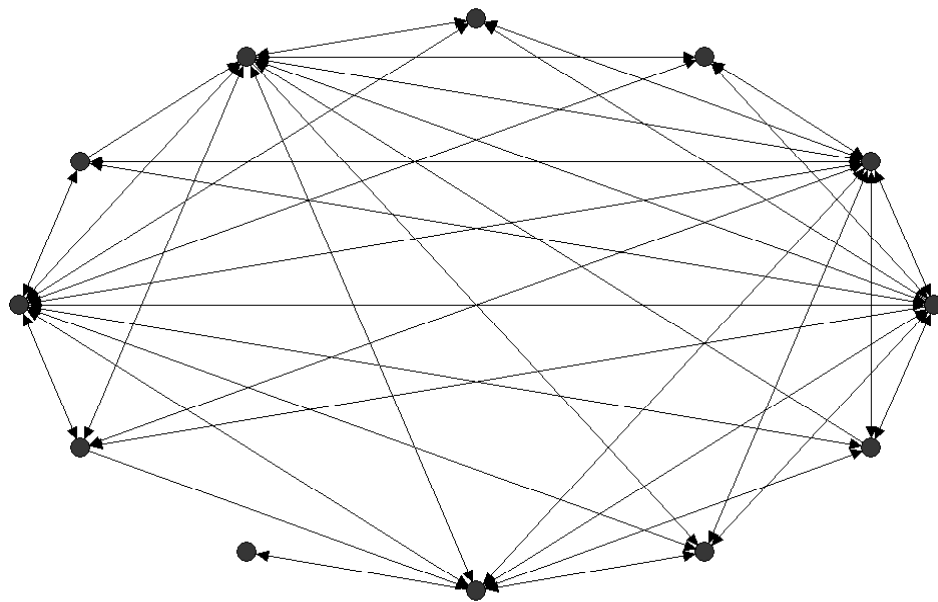
<sup>42</sup> For a description of the cases, see chapter three, section 3.2.3.

add names that I had not listed. I entered the resulting matrices of communication links into UCINET (Borgatti et al. 2002) and visualized them with NetDraw (Borgatti 2002). The resulting pictures, representing a static ‘snapshot’ of the networks at the same point in time, are shown in figures 4-1 through 4-8. The first four networks are displayed in a circular fashion to better visualize the density of ties, and the remaining four networks are rearranged in order to visualize the functional subdivisions. When looking at figures 4-1 through 4-4, it is apparent that the density of ties increases gradually from DGP 1 to DGP 4, indicating weak ties (in terms of frequency of communication) in the projects that are in their conceptual phase. Due to the varying stages of advancement of the four projects, this phase can be observed directly only in the network of DGP 1, whereas in the other cases I had to rely on the accounts of previous configurations by the people who are currently involved in the project.

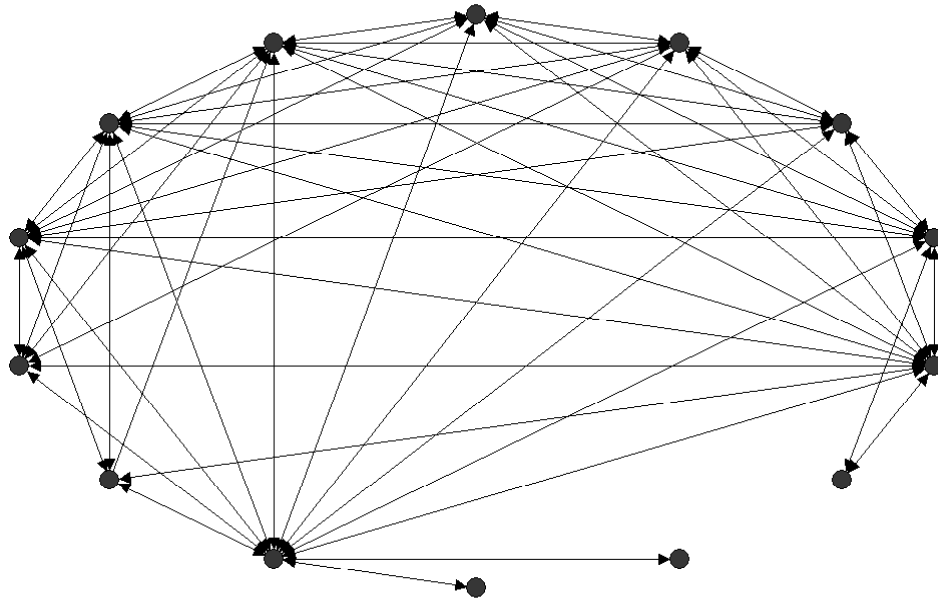
In the implementation phase, the knowledge networks of DGPs gain in density, indicating stronger ties. Team members have established most of their contacts and use them for “getting the work done”. Contrarily to the conceptual phase, this development can be recognized in DGP 2 and DGP 3, but becomes clearly visible in DGP 4, the most advanced project.



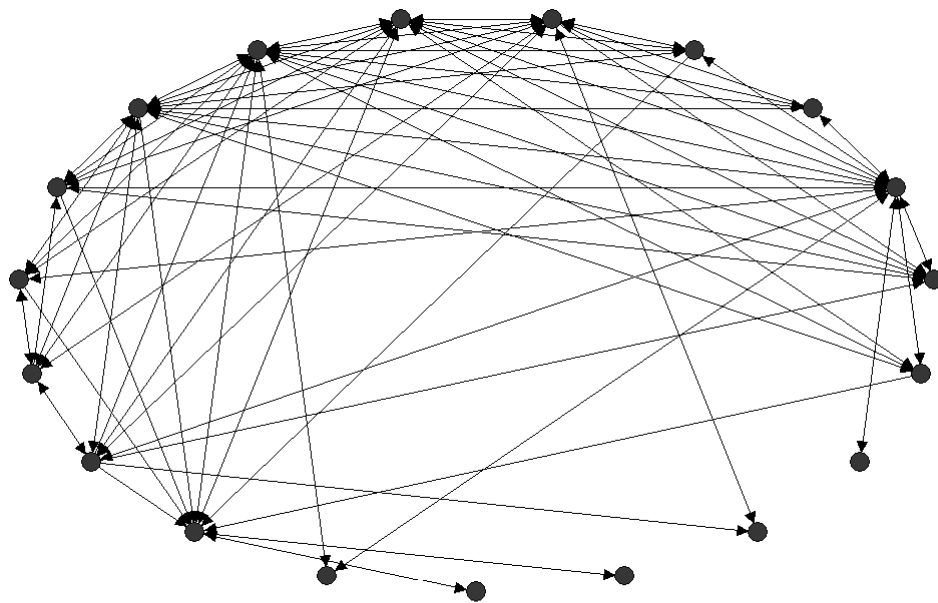
*Figure 4-1: Knowledge network of DGP 1 – density of ties*



*Figure 4-2: Knowledge network of DGP 2 – density of ties*



*Figure 4-3: Knowledge network of DGP 3 – density of ties*



*Figure 4-4: Knowledge network of DGP 4 – density of ties*

A different way of looking at the knowledge networks of DGPs is by their functional subdivision. This representation allows a mapping of the informal network on the formal bureaucratic structure by rearranging the actors according to their affiliation and their position in the hierarchy, without altering the informal ties between individuals. Accordingly, figures 4-5 through 4-8 show the same networks as the four previous ones, but the functional subdivision highlights the ties across agencies, as well as horizontal and vertical communication links. In addition to subdividing the networks by functions through vertical lines, I made the following three distinctions: (1) interviewees are marked by dark dots, (2) individuals named by the interviewees (but not interviewed) are marked by white dots, and (3) project managers are marked by shaded, slightly bigger dots. As with the previous representation of the density of ties, intriguing conclusions can be derived from comparing figures 4-5 through 4-8. In this representation the increasing density of ties is also visible, but in addition it becomes evident that the configuration of the networks changes considerably from DGP 1 to DGP 4. In the case of DGP 1, the network is remarkably sparse (actors with few ties from many different agencies), whereas in DGP 2 and DGP 3, the networks evolve around the project teams, which are tightly-knit and fairly integrated into the larger project group. DGP 4, at the other end of the scale, features multiple tightly-knit groups embedded in a dense network.

Finally, among many possible interpretations, it appears particularly interesting to observe that (1) DGP 4, the project in the most advanced stage, is very strongly integrated across functions; (2) DGP 2 has virtually no ties to IT; (3) In all projects the individual in charge of communications plays an important role; (4) The individual who was the initial driving force of the project is generally better connected than the actual project manager; and (5) In all cases there is a discrepancy between hierarchical functions and positions in the social network of individuals.

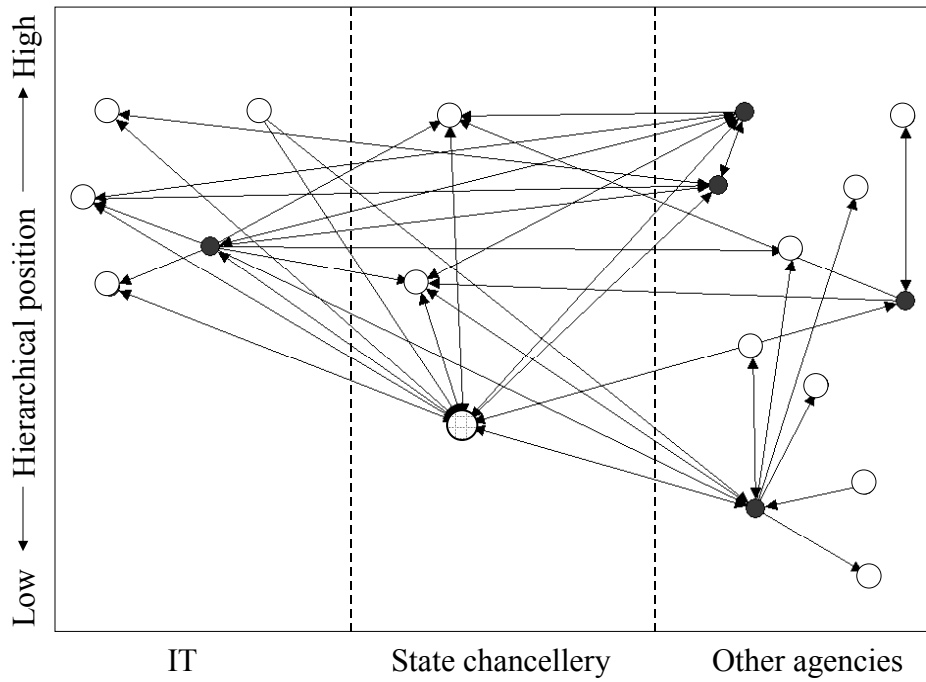


Figure 4-5: Knowledge network of DGP 1 – functional subdivision

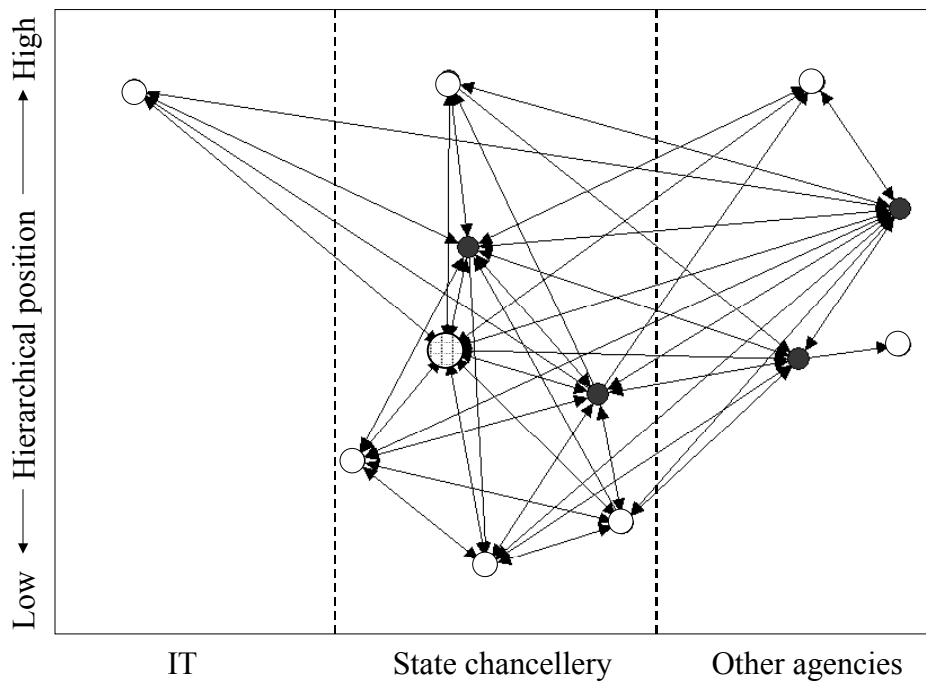


Figure 4-6: Knowledge network of DGP 2 – functional subdivision

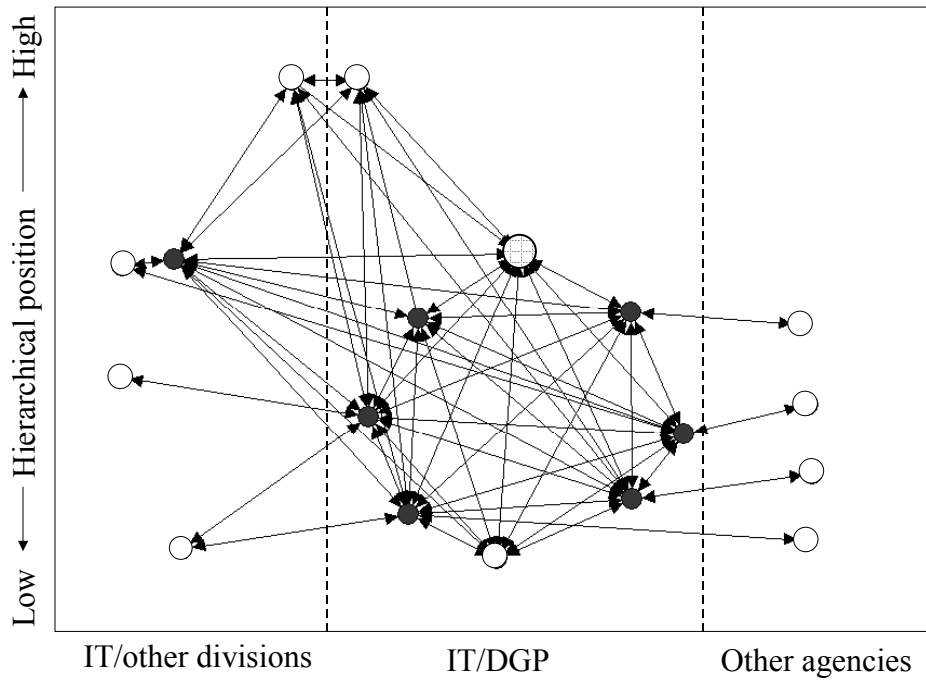


Figure 4-7: Knowledge network of DGP 3 – functional subdivision

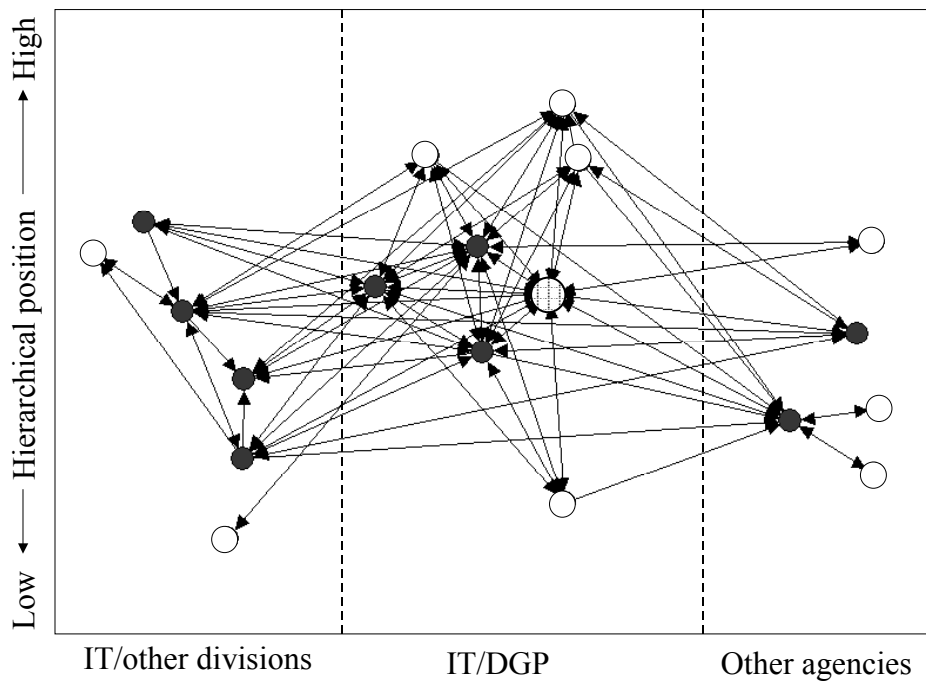


Figure 4-8: Knowledge network of DGP 4 – functional subdivision

### 4.4.3 Group dynamics

As stated earlier in this dissertation, the framework of group dynamics is one that views people as coexisting in groups because of functional, cognitive, and structural interdependencies that link them together.

Due to the configuration of the projects in this study, merely DGP 2 and DGP 3 were well suited for observing group dynamics, being the only two projects with an easily identifiable, closely-knit team. Whereas in DGP 1 the group was very loosely connected, in DGP 4 multiple groups evolved as a consequence of early DG initiatives, serving as “knowledge hubs” in the larger network. It would have been extremely interesting to study the interdependencies of these groups in detail, but the necessary resources in terms of manpower and time were beyond the possibilities at my disposal for this study.

Thus, considering DGP 2 and DGP 3, there are some similarities other than the configuration of the DGP as a team: in both cases, the project managers were hired from ‘the outside’<sup>43</sup>, and subsequently had the opportunity to hire the team members according to their own judgment, with a few exceptions. The project manager of DGP 3 described his preferences regarding the composition of his team in the following way:

Now, I'm not looking for anybody that is all about work. I want people to have outside interests. I certainly have outside interests. [...] I've had people who have worked for me who were like that, and you certainly get great short-term benefits out of them, but in the long run it can be more destructive than at the beginning. So I encourage people to not live work, that we have a lot to do, and I want them to be focused while they're here, but we laugh, we celebrate victories, we console each other with defeats, we try to stay together as a team.

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<sup>43</sup> In DGP 2, the project manager came from the private sector, whereas in DGP 3 the project manager had previously worked in a different agency of the same government.

Hence it is not surprising that the group dynamics of these two teams are extremely positive. In terms of shared mental models, these seem to be a nearly perfect match in DGP 2, since it is a homogeneous group where knowledge, skills, attitudes, preferences, tendencies are similar. Team-specific knowledge of teammates helps members to better tailor their behavior to what they expect from teammates. This internal strength apparently facilitates the interaction with externals, such as IT people or managers of partial projects:

Because of the partial projects that we coordinate, many people from the state government come to us, and I think that they like the fact that they are coming to a young and dynamic team. [...] I think they really appreciate that. [...] The intranet project was a very positive experience, that we were able to transmit our own dynamics from the project to people, especially the IT community – actually people even congratulated us on the project in the end; people who had made no secret of their skepticism in the beginning, who had even reacted rather aggressively.

Overall, it is apparent that projects members of all four DGPs are functionally interdependent, since they share a common task that cannot be reached by an individual alone. As for cognitive interdependence, I have shown throughout this study that informal social communication plays a crucial role in all four projects. However, a collective sentiment in the Durkheimian way was recounted only by DGP 4. Finally, all DGPs showed a high structural interdependence, reinforcing Brass's (1984) claim that informal structures shadow formal structures.



## **5. Exploration and exploitation: Toward a theory of knowledge sharing in DGPs**

In the previous chapter, I have analyzed the decisionmaking processes, the modes and influencing factors of knowledge sharing, and the coordination mechanisms of knowledge in four DGPs. I have shown in detail how these projects differ in their stage of advancement, in the functional subdivisions of their actors, and in their organizational form; and how these factors affect the way knowledge is shared in the projects. In this chapter, I reassemble the salient features of DGP processes that emerged during the analysis and distill them into core categories<sup>44</sup>. Two main dimensions in terms of tasks emerged in achieving the project objectives, each of them subdivided into two phases: (1) Conception and implementation, and (2) Exploration and exploitation. I present the developed theory by means of four propositions, and conclude the chapter with a discussion of the theory.

### **5.1 Task dimension I: Conception and implementation**

Throughout this study, I have asserted that DGPs may be subdivided into two major phases; conception and implementation. At first glance, this finding appears to be trivial, as the very nature of any project requires that the project be conceived first, and implemented subsequently. What makes this pronouncement relevant is the fact that these two phases necessitate certain characteristics of tasks.

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<sup>44</sup> For a detailed list of the core categories and their sub-categories, see Appendix E.

Borrowing the concept of decomposability from Herbert Simon (1981), I propose that the conception and implementation phases move along a continuum of task decomposability. Simon illustrates this concept with a parable of two watchmakers (Simon 1981:200):

There once were two watchmakers, named Hora and Tempus, who manufactured very fine watches. Both of them were highly regarded, and the phones in their workshops rang frequently – new customers were constantly calling them. However, Hora prospered, while Tempus became poorer and poorer and finally lost his shop. What was the reason?

The watches the men made consisted of about 1,000 parts each. Tempus had so constructed his that if he had one part assembled and had to put it down – to answer the phone, say – it immediately fell to pieces and had to be reassembled from the elements. The better the customers liked the watches, the more they phoned him and the more difficult it became for him to find enough uninterrupted time to finish a watch.

The watches that Hora made were no less complex than those of Tempus. But he had designed them so that he could put together subassemblies of about ten elements each. Ten of these subassemblies, again, could be put together in a larger subassembly; and a system of the latter subassemblies constituted the whole watch. Hence, when Hora had to put down a partly assembled watch to answer the phone, he only lost a small part of his work, and he assembled his watches in only a fraction of the man-hours it took Tempus.

Hence, the concept of decomposability stands for the extent to which large tasks can be decomposed into smaller, specialized tasks. With regard to the two phases of DGPs, the degree of decomposability is low during the conception phase, requiring the collaboration of different agencies and stakeholders; and it is high in the implementation phase, once the necessary tasks have been defined.

*Proposition 1. The conception and implementation phases of DGPs move along a continuum of task decomposability, where the decomposability is low during conception and high during implementation.*

## **5.2 Task dimension II: Exploration and exploitation**

The second dimension emerged in the course of my analysis of knowledge sharing activities. It describes the variation in the content of these activities, moving from discovery to retrieval of knowledge. In other words, the first phase is dedicated to the exploration of knowledge, while the second phase involves the exploitation of knowledge. This dichotomy was originally coined by Schumpeter as exploration of new possibilities and exploitation of old certainties (Schumpeter 1934), and brought to the organizational learning community by James March in a famous *Organization Science* article (March 1991). According to March (1991:71),

Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution.

Returning to the second task dimension, the two phases demand certain types of organization: Whereas there is a greater reliance on networks during the exploration phase, a hierarchical structure is more efficient in the exploitation phase. From a governance perspective, this is equivalent to asserting that collaboration among actors in a network prevails during the exploration phase; and the coordination and control of actors is more important during the exploitation phase.

In analogy to the first dimension, I propose that exploration and exploitation also move along a continuum, in this case given by the

configuration of ties in the informal network. The network is sparse in the exploration phase and dense in the exploitation phase, corresponding to weak ties during exploration and strong ties during exploitation.

*Proposition 2. The exploration and exploitation phases of knowledge move along a continuum of network configuration, where the network is sparse during exploration and dense during exploitation.*

### **5.3 Assembling the parts: A theory of knowledge sharing in DGPs**

It is intuitive to assume that the two task dimensions occur concurrently, and that they influence each other in some way. Before I draw a conclusion on this assertion, a few remarks need to be made regarding the characteristics of the proposed dimensions. The first task dimension, conception and implementation, builds on subsequent phases, therefore carrying a temporal connotation. Similarly, the phases of the second task dimension, exploration and exploitation, might succeed each other temporally, but their main characteristic is that they are content-related. As March (1991) affirmed, a combination of exploration and exploitation must be present at all times. Therefore, it can be asserted that the two task dimensions are interrelated. The implementation of DG requires a balanced mix of exploration and exploitation, where exploration is more important in the conceptual phase, and exploitation becomes more fruitful in the implementation phase.

*Proposition 3. In DGPs, task dimension I (conception and implementation) and task dimension II (exploration and exploitation) are interrelated, where exploration is primarily associated with the conceptual phase, and exploitation is mainly linked to the implementation phase.*

Since the two task dimensions discussed above are interrelated, it makes sense to arrange them in a two-by-two matrix. The figure below depicts the matrix, summarizing the theory developed in this chapter.

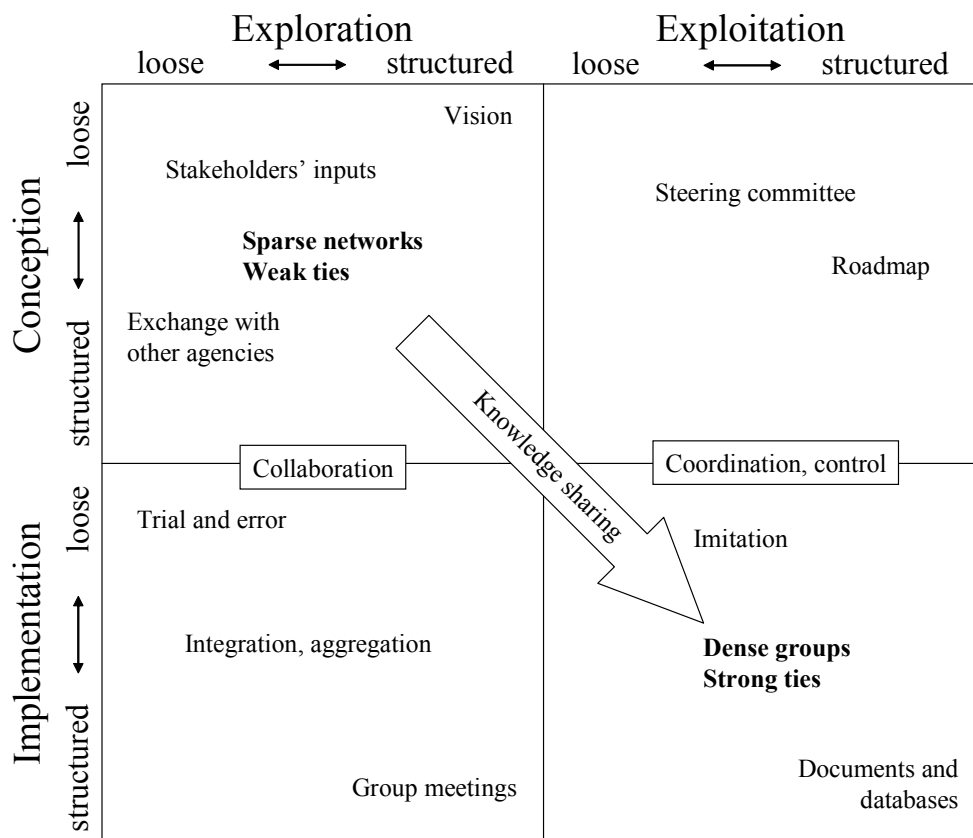


Figure 5-1: Exploration and exploitation of knowledge in DGPs

Each quadrant resulting from the interrelation between the two task dimensions is filled with concepts that were drawn from the findings presented in chapter four. The twelve concepts (out of the original 160), which retained their significance after repeated coding procedures, address the decisionmaking processes of DGPs (vision, roadmap, steering committee, and stakeholders' inputs), the coordination mechanisms of knowledge (collaboration, integration and aggregation, and coordination and control), and the modes of knowledge sharing (exchange with other agencies, trial and error, group meetings, imitation, and documents and databases).

Within the quadrants, the concepts are positioned according to their loose or structured connotations. *Stakeholders' inputs* in the conceptual phase come in an unstructured form (loose conception) from a sparse network (loose exploration). A project's *vision* is broad, but its exploration is structured through a strategy. The steering committee supervises the conceptual phase, giving a general direction to follow. *Exchange with other agencies* in the conceptual phase is structured by functions and tasks, but the search for knowledge can be broad. The *roadmap* represents the structure for the conceptual phase, giving clear directions on how to proceed. *Trial and error* in the implementation phase is an unstructured search strategy for improvement. *Integration and aggregation* can occur in all forms of exploration during the implementation phase. *Group meetings* during implementation are structured events with a structured agenda to explore new ideas. *Imitation* occurs in the implementation phase and utilizes the knowledge of others. Finally, *documents and databases* serve the purpose of a structured implementation and are instruments for a structured exploitation of knowledge.

With regard to the types of organization, I have shown that DGPs rely on sparse networks during the conceptual phase of the project, and tend to employ teams or tightly-bounded groups when the project moves towards implementation.

*Proposition 4. In a lifecycle view of a DGP, the project's advancement is driven by effective knowledge sharing, moving from exploration in a sparse network during the conceptual phase to exploitation in one or more dense groups in the implementation phase.*

## 5.4 Discussion

The presented theory shows that the implementation of DG requires a balanced mix of exploration and exploitation, where, due to the degree of task decomposability, exploration is more important in the conceptual phase, and exploitation becomes more fruitful in the implementation phase. From a governance perspective, collaboration among actors in a network prevails during the exploration phase; and the coordination and control of actors is more important during the exploitation phase. With regard to the types of organization, I have shown that different configurations of knowledge networks in DGPs related to different stages in the advancement of the project: DGPs rely on sparse networks during the conceptual phase of the project, and tend to employ teams or tightly-bound groups when the project moves towards implementation.

Some caveats to this theory can be described by means of the matrix representation. Two of the quadrants, conception/exploitation to the upper right and implementation/exploration to the lower left are less immediate than the other two, as they appear as 'side products' of the general flow of the

model. With the present results it is also difficult to demonstrate that apart from the general flow there exists a feedback loop, leading from the exploitation of knowledge in one partial project to the exploration of new possibilities. This feedback loop would need to be studied in a longitudinal analysis. Furthermore, not every cell within the quadrants could be filled with meaning. It might be that this is empirically impossible, but such an assertion certainly requires additional research into the model.

## 6. Conclusions

In this study I have shown that knowledge sharing plays a crucial role in DGPs. These projects bring together individuals from different organizational units, with different skill sets, and different mental models, to work on a common goal – the implementation of the project. Of particular importance in this context are the modes and influencing factors of knowledge sharing, and the coordination mechanisms of knowledge.

Knowledge sharing processes are a central feature of the functioning of government, but, with very few exceptions (cf. Blau 1963), they have received surprisingly little attention in the literature. The importance of knowledge sharing has become even more evident with the rise of digital government (DG) initiatives, as these have a networking effect on bureaucracies. The fact that individuals with differing skill sets and from different organizational units work on a common task creates a network that coexists with the functional subdivision of tasks within the organization. Common tasks by their nature require knowledge sharing in order to be fulfilled successfully. With multiple agencies and multidisciplinary knowledge coming together, it is necessary to combine and reconnect the required knowledge.

The study combined a qualitative exploratory case study design and a grounded theory approach, with the aim of theory building through the comparative analysis of case studies. The sample for this study consisted of four DGPs in two different countries, Switzerland and the United States of America.

Findings of the empirical study shed light on the decisionmaking processes, the modes and influencing factors of knowledge sharing, and the coordination mechanisms of knowledge in the four DGPs. I showed in detail how these projects differ in their stage of advancement, in the functional

subdivisions of their actors, and in their organizational form; and how these factors affect the way knowledge is shared in the projects.

The study's main contribution is a theoretical model for knowledge sharing in DGPs. It ties together processes and content of knowledge sharing through two task dimensions, each of them subdivided into two phases: (1) Conception and implementation of the project, and (2) Exploration and exploitation of knowledge. I showed that the implementation of DG requires a balanced mix of exploration and exploitation of knowledge, where exploration is more important in the conceptual phase, and exploitation becomes more fruitful in the implementation phase. DGPs rely on sparse networks during the conceptual phase of the project, and tend to employ teams or tightly-bound groups when the project moves towards implementation.

## **6.1 Research implications**

The study endeavors to break new ground by analyzing government agencies through an organizational behavior lens. It contributes to the existing body of theory on knowledge sharing and organizational learning by applying these theories to modern government agencies, and thus attempting to bridge a gap that has been left since Peter Blau's "*The Dynamics of Bureaucracy*" (1963). It also contributes to the public management literature by shedding light on the human processes that drive interagency collaboration. The study contributes to social psychology by positioning project teams in the context of their organizations. It adds to organizational theory by building on the ongoing discourse of how organizational forms affect performance.

## 6.2 Policy implications

The presented model of knowledge sharing in DGPs assists public managers in understanding how to conceive and implement a DGP more effectively by emphasizing the crucial importance of knowledge sharing in inter-agency collaboration. Along the core categories of the model, exploration and exploitation, some specific practical recommendations for the conception and implementation are the following:

*Exploration.* In the conceptual stage, it is important to draw on groups of all possible stakeholders, bringing them together in task forces, focus groups, or work groups. At this stage, possibilities are being explored, and it is preferable to choose from a vast array of possibilities rather than having narrowed down the alternatives from the outset. Stakeholder groups include, in random order, representatives from all levels of government, private sector representatives, vendors, non-profit organizations, interest groups, activists, citizens, small businesses, and professional organizations. If a consultant is hired, it is crucial that the client agency take the project leadership, collaborating closely with the consultant in every stage of the contract. Even if the conception of a project is already well on its way, employing focus groups can be a good way of assessing whether the direction the project is taking is in line with its stakeholders' expectations. It pays to nurture the creation and maintenance of informal networks during these events. A big part of organizational learning happens at meetings and in exchanges with other agencies. Ownership of ideas is a major motivational factor, and executive sponsorship is a must.

*Exploitation:* The implementation of a DGP requires some structured process. At an early stage, this could be done by a team of individuals working exclusively on the project, or a single individual who is clearly in charge of coordination efforts. Whereas large cross-agency projects such as the IT infrastructure should be managed centrally, ownership of projects

should be given to the agencies where the idea for the project originated, but duplications avoided through central coordination. To efficiently serve as a knowledge hub, DGP team should actively facilitate the exchange among agencies by giving incentives such as shared services, and by helping them partner up with like-minded individuals and agencies.

### **6.3 Recommendations for future research**

With regard to the proposed theoretical model, I have already acknowledged the existence of some caveats to this theory. In the matrix, not every cell within the quadrants could be filled with meaning. It might be that this is empirically impossible, but such an assertion certainly requires additional research into the model.

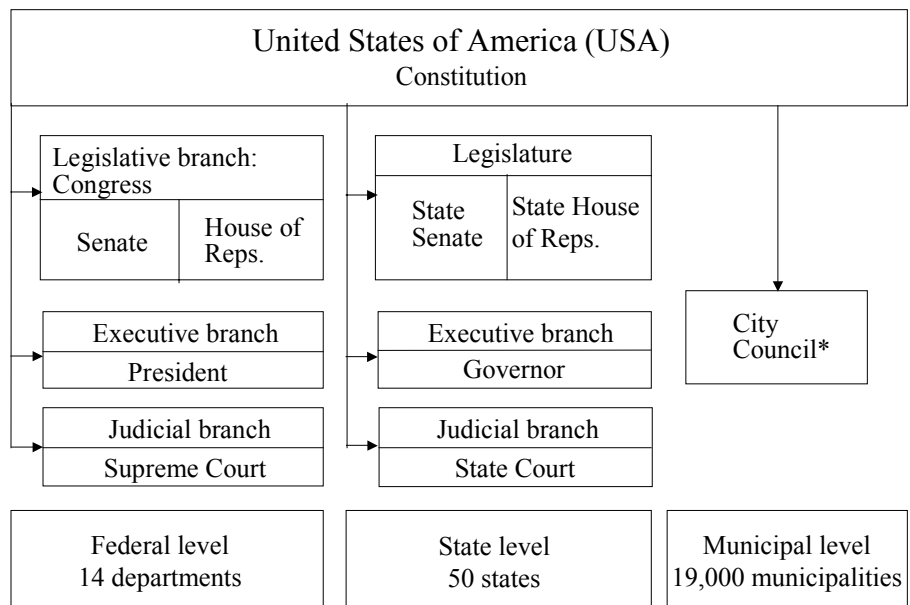
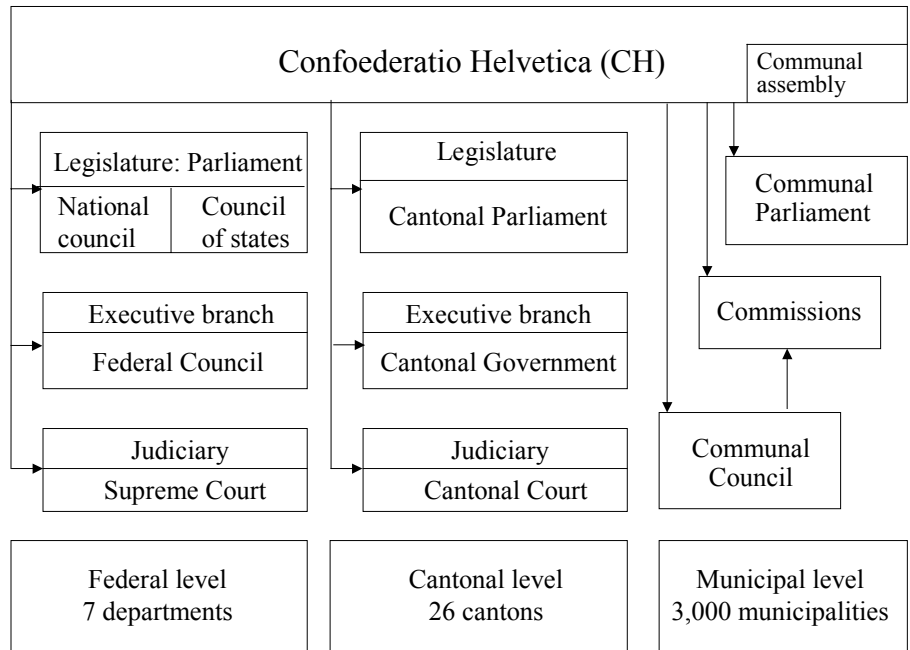
As I developed a theory on knowledge sharing in DGPs, it would be useful to test this theory in a quantitative study, expanding the sample to a representative size. Furthermore, significant insights should be gained by extending the social network analysis of the DGPs to various types of networks, and by quantifying the strength of ties. Added value would also derive from measuring the network dynamics over time, especially if analyzing the same network in both the conception and implementation phases of the project.

## Appendix A: List of Abbreviations

cf.	confer (compare)
CH	<i>Confoederatio Helvetica</i> (Switzerland)
CIO	Chief Information Officer
CRM	Customer Relationship Management
CMS	Content Management System
DG	Digital Government
DGP	Digital Government Project
DoL	Department of Licensing
DMV	Department of Motor Vehicles
DoR	Department of Revenue
e.g.	<i>exempli gratia</i> (for example)
i.e.	<i>id est</i> (that is)
GIS	Geographic Information System
HR	Human Resources
IT	Information Technology
MIS	Management Information System
NCDG	National Center for Digital Government
NPM	New Public Management
NPR	National Performance Review
NUD*IST	Non-numerical Unstructured Data Indexing Searching and Theorizing
SNA	Social Network Analysis
URL	Uniform Resource Locator
USA	United States of America
www	World Wide Web
Y2K	Year 2000



## Appendix B: The Swiss and US political systems



\*Many different models of local government



## Appendix C: Informed Consent Form

Dear Participant,

Thank you for agreeing to participate in my research project, "Knowledge Flows in Digital Government Projects," under the supervision of Prof. Kuno Schedler at the University of St. Gallen, Switzerland. Please read this document carefully, then sign below and return it to me. You may mail this consent form or hand it to me before we begin our interview.

The objective of the study is to understand the causes behind success or failure of digital government projects. My research will look at how knowledge is shared in public sector organizations in the context of digital government projects. I hope to use my results to develop policy recommendations for various levels of government, and to develop a theory on knowledge sharing in public sector organizations with regard to the implementation of digital government projects. To accomplish this, I am conducting case studies on four digital government projects in Switzerland and in the US. These case studies will be based, in part, on in-depth interviews with key project members like yourself. Our interview will take place face-to-face, guided by a few open questions. In order to achieve sufficient accuracy for my analysis, I would like to record the interview on a digital device. This interview will be used by me only, and will not be made available to anyone else. Should I wish to use the data for any subsequent work, I will seek your consent to use it again.

All information will be treated to preserve your anonymity and reported in the research documented only in aggregate form or with all identifiable attributes masked. You may also refuse to answer any specific questions during the interview, and you may cease participation at any point. The final document will be in the form of a PhD thesis. Prior to publication, you will be provided with a summary of the results, and you will have the possibility to make corrections to passages that concern your participation in the case.

Your signature below indicates that you have understood your participation in the study, but in no way does this waive your legal rights nor release the researcher from her legal and professional responsibilities. If you have any questions about your participation, I will try to address them as quickly as possible. You can reach me by telephone at 617-384-8379 or by email ([maria\\_scharf@ksg.harvard.edu](mailto:maria_scharf@ksg.harvard.edu)).

Sincerely,

Maria Christina Scharf

Participant's Signature, Date:

Participant's Name (please print):

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## **Appendix D: Interview Guideline and Network Survey**

### ***Own function/work environment***

- What is your role in the digital government project?
- How did you come to be part of the project?
- What is your job history?

### ***Description of the project***

- What was the motivation for the project?
- Could you describe the project implementation process?
- Where are you in the process?
- How do you handle the coordination of partial projects/tasks?
- How do you handle the collaboration with team members/stakeholders/vendors?
- Where are the main problems?

### ***Identification of knowledge sharing processes***

- Who are your most frequent contact persons regarding digital government in the organization?
- Which means of communication do you use (email, internet, intranet, telephone, face-to-face)?
- Do you generally need a lot of information (what kind?) from your colleagues for carrying out your work?
- Do you receive the information you need (what kind?) from your colleagues?
- Are you frequently asked for information (what kind)?
- Do you think that your personal knowledge is well exploited in the organization?

### ***Personal impressions***

- Where do you see major chances/challenges in your work?
- Do you enjoy your own work?
- Anything else that you think I should know?

Of the individuals listed below, whom do you communicate with regarding digital government?

- a) If you *give* information to somebody, please check the corresponding box in the **row** with your name.
  - b) If you *receive* information from somebody, please check the corresponding box in the **column** with your name.
- If you communicate on digital government with individuals who are not listed, please add those names in the last 3 rows and columns. Thank you very much!

	a	b	c	d	e	f	g	h	i	j	k	1	2	3
a		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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f	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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i	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
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Again, all information will be treated to preserve your anonymity and reported in the research documented only in aggregate form or with all identifiable attributes masked.

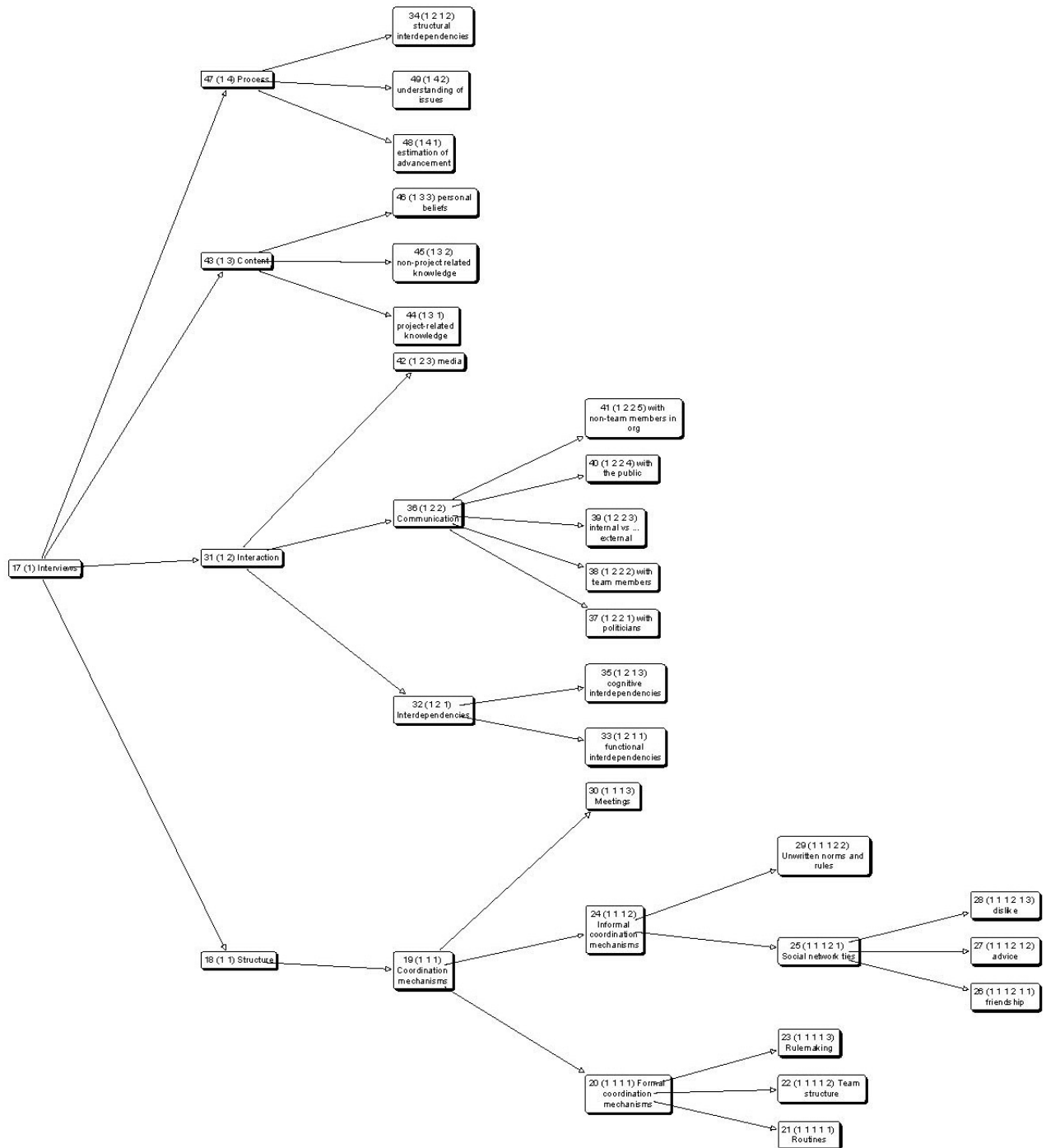
## Appendix E: Codebook

### Open coding: Free nodes <sup>45</sup>

(F 19) best practices	(F 33) fear of technology	(F 9) perceived leadership
(F 26) boundary spanner	(F 64) feeling threatened	(F 14) personal motivation
(F 22) budget issues	(F 62) focus groups, work groups	(F 61) persuasion
(F 65) challenges	(F 35) frustration	(F 11) physical location
(F 39) choice of steering group	(F 46) gatekeeper	(F 52) political support
(F 38) choice of team members	(F 30) hierarchy	(F 50) potential
(F 54) collaboration	(F 60) incentives	(F 74) prestige
(F 48) complexity	(F 28) initiative	(F 4) priorities
(F 8) conception vs. implementation	(F 69) integration, aggregation	(F 23) public sector reform
(F 10) consultants	(F 24) IT department	(F 59) put forth own interests
(F 77) contagion	(F 27) knowledge broker	(F 7) roles
(F 40) coordination, control	(F 70) knowledge creation	(F 56) security
(F 34) criticism	(F 3) knowledge hoarding	(F 2) selling to politicians
(F 31) customer feedback	(F 37) knowledge storage&retrieval	(F 47) size
(F 1) customer needs	(F 68) learning	(F 75) stakeholders
(F 42) data privacy, confidentiality	(F 41) legacy systems	(F 76) stovepipes
(F 79) decentralization	(F 49) legal issues	(F 58) strategy
(F 45) decision making	(F 16) location attractiveness	(F 12) tactical moves
(F 25) disinterest	(F 71) making errors	(F 63) team composition
(F 32) duplication	(F 21) marketing	(F 6) team formation
(F 51) efficiency	(F 53) mentality, culture	(F 36) time, speed
(F 13) estimation of own work	(F 5) motivation for project	(F 29) transparency
(F 55) exchange with other agencies	(F 18) objectives	(F 20) trial and error
(F 44) experience	(F 67) opposition, skepticism	(F 57) trust
(F 15) exploitation of own knowledge	(F 78) outsourcing	(F 72) uncertainty
	(F 66) participation	(F 43) use of existing technology
		(F 17) vision
		(F 73) work environment

<sup>45</sup> 'F' stands for 'free node', meaning that it has not yet been assigned to a category. For easier reading, the nodes are listed in alphabetical order. The numbering of the nodes follows their sequential creation. Missing numbers indicate deleted nodes.

Open coding: Graphical representation of node hierarchies



**Axial coding: Categorizing concepts**

Node address	Node title	Documents coded <sup>46</sup>	Text units
(1)	/Interviews	0	0
<b>(1 1)</b>	<b>DGP processes in the organizational context</b>	11	248
(1 1 1)	/objectives	13	110
(1 1 1 1)	/vision	15	296
(1 1 1 2)	/location attractiveness	3	38
(1 1 1 3)	/prestige	3	24
(1 1 1 4)	/potential	4	25
(1 1 1 5)	/customer needs	11	148
(1 1 1 6)	/customer feedback	7	107
(1 1 2)	/project initiation and process	0	0
(1 1 2 1)	/strategy	7	59
(1 1 2 2)	/motivation for project	4	88
(1 1 2 2 1)	/initiative	12	140
(1 1 2 3)	/initial position	2	27
(1 1 2 4)	/setting priorities	11	187
(1 1 2 5)	/choice of steering group	5	50
(1 1 2 6)	/focus groups, work groups	8	121
(1 1 2 7)	/choice of team members	3	44
(1 1 2 8)	/team formation	12	190
(1 1 2 9)	/public sector reform	9	130
<b>(1 2)</b>	<b>Decisionmaking and complexity</b>	10	220
(1 2 1)	/material factors	0	0
(1 2 1 1)	/size	3	18
(1 2 1 2)	/physical location	8	103
(1 2 2)	/immaterial factors	0	0
(1 2 2 1)	/transparency	4	24
(1 2 2 2)	/uncertainty	4	31
(1 2 2 3)	/time, speed	8	89
<b>(1 3)</b>	<b>Common issues of DGPs</b>	0	0
(1 3 1)	/budget issues	12	155
(1 3 2)	technology	0	0
(1 3 2 1)	/security	4	50
(1 3 2 2)	/data privacy, confidentiality	5	31
(1 3 2 3)	/legacy systems	8	66
(1 3 3)	/legal issues	5	61
(1 3 4)	/efficiency	7	37
(1 3 4 1)	/duplication	5	43

<sup>46</sup> Nodes that code 0 documents were created for organizing purposes only ('dummy nodes').

<b>(1 4)</b>	<b>Patterns of interaction</b>	0	0
(1 4 1)	/communication channels	8	92
(1 4 1 1)	/with team members	11	153
(1 4 1 2)	/with non-team members in org	9	75
(1 4 1 3)	/with politicians	5	69
(1 4 1 4)	/with the public	11	101
(1 4 1 5)	/stakeholders	5	35
(1 4 2)	/internal vs. external communication	4	43
(1 4 2 1)	/marketing	5	50
(1 4 2 2)	/persuasion	6	51
(1 4 2 3)	/role of IT department	8	91
(1 4 2 4)	/role of consultants	12	141
(1 4 3)	/political support	11	122
(1 4 3 1)	/selling to politicians	5	202
(1 4 3 2)	/tactical moves	3	38
<b>(1 5)</b>	<b>DGP processes from an individual perspective</b>	0	0
(1 5 1)	/view of process	0	0
(1 5 1 1)	/estimation of advancement	9	93
(1 5 1 2)	/understanding of issues	14	162
(1 5 1 3)	/personal beliefs	8	130
(1 5 1 4)	/perceived leadership	9	113
(1 5 1 5)	/work environment	4	31
(1 5 2)	/view of self	9	93
(1 5 2 1)	/tactical moves	3	38
(1 5 2 2)	/put forth own interests	3	24
(1 5 2 3)	/estimation of own work	12	115
(1 5 2 4)	/exploitation of own knowledge	5	38
<b>(1 6)</b>	<b>Coordination mechanisms of knowledge</b>	12	119
(1 6 1)	/hierarchy	18	272
(1 6 1 1)	/rules	4	25
(1 6 1 2)	/stovepipes	8	70
(1 6 1 3)	/integration, aggregation	4	47
(1 6 1 4)	/coordination, control	12	136
(1 6 1 5)	/decentralization	2	17
(1 6 1 6)	/routines	4	31
(1 6 1 7)	/unwritten norms and rules	3	19
(1 6 2)	/social networks	12	153
(1 6 2 1)	/types of ties	0	0
(1 6 2 1 1)	/friendship	3	19
(1 6 2 1 2)	/advice	8	126
(1 6 2 1 3)	/affect	2	37

<b>(1 6)</b>	<b>Coordination mechanisms of knowledge</b>	<b>(cont.)</b>	<b>(cont.)</b>
(1 6 2 2)	/roles	8	52
(1 6 2 2 1)	/boundary spanner	7	66
(1 6 2 2 2)	/knowledge broker	4	163
(1 6 2 2 3)	/gatekeeper	6	44
(1 6 2 2 4)	/experience/expert	9	89
(1 6 3)	/group dynamics	9	89
(1 6 3 1)	/team composition	5	38
<b>(1 7)</b>	<b>Influencing factors of knowledge sharing</b>	<b>0</b>	<b>0</b>
(1 7 1)	/motivation	13	159
(1 7 1 1)	/initiative	12	140
(1 7 1 2)	incentives	10	78
(1 7 1 3)	/participation	1	6
(1 7 1 4)	/frustration	4	36
(1 7 2)	/trust	5	26
(1 7 2 1)	/feeling threatened	8	52
(1 7 3)	/criticism	5	47
(1 7 3 1)	/disinterest	2	21
(1 7 3 2)	/opposition, skepticism	4	29
(1 7 4)	/culture	8	58
(1 7 5)	/use of information technology	6	69
(1 7 5 1)	/means of communication	8	80
(1 7 5 2)	/fear of technology	4	21
<b>(1 8)</b>	<b>Modes of knowledge sharing in DGPs</b>	<b>0</b>	<b>0</b>
(1 8 1)	/knowledge storage&retrieval	8	134
(1 8 2)	/imitation	0	0
(1 8 2 1)	/best practices	7	88
(1 8 2 2)	/exchange with other agencies	8	101
(1 8 3)	/learning	4	32
(1 8 3 1)	/trial and error	9	48
(1 8 3 2)	/making errors	3	16
(1 8 3 3)	/exchange with other agencies	8	101
(1 8 3 4)	/collaboration	9	120
(1 8 3 5)	/persuasion	6	51
(1 8 4)	/meetings	10	107

**Selective coding: saturated categories**

Node address	Node title	Documents coded <sup>47</sup>	Text units
(1)	/Interviews	0	0
<b>(1 1)</b>	<b>Decisionmaking processes in DGPs</b>	11	248
(1 1 1)	/motivation for project	3	64
(1 1 1 1)	/initiative	11	151
(1 1 1 2)	/prestige, location attractiveness	6	63
(1 1 1 3)	/public sector reform	9	142
(1 1 2)	/objectives	12	106
(1 1 2 1)	/vision	13	240
(1 1 2 2)	/customer needs	11	179
(1 1 3)	/project initiation and process	0	0
(1 1 3 1)	/strategy	7	73
(1 1 3 2)	/setting priorities	11	160
(1 1 3 3)	/task forces, work groups	10	185
(1 1 3 4)	/team formation	14	266
(1 1 3 5)	/role of IT department	8	91
(1 1 3 6)	/role of consultants	12	141
<b>(1 2)</b>	<b>Modes of knowledge sharing in DGPs</b>	0	0
(1 2 1)	/documents and databases	8	139
(1 2 2)	/imitation	9	97
(1 2 3)	/learning	0	0
(1 2 3 1)	/trial and error	11	103
(1 2 3 2)	/exchange with other agencies	6	92
(1 2 3 3)	/collaboration	10	148
(1 2 4)	/meetings	14	132
<b>(1 3)</b>	<b>Influencing factors of knowledge sharing</b>	0	0
(1 3 1)	/motivation	13	155
(1 3 1 1)	/initiative	10	141
(1 3 1 2)	incentives	10	78
(1 3 2)	/trust	6	44
(1 3 2 1)	/feeling threatened	8	93
(1 3 3)	/use of IT	14	162
(1 3 4)	/culture	8	58

<sup>47</sup> Nodes that code 0 documents were created for organizing purposes only ('dummy nodes').

<b>(1 4)</b>	<b>Coordination mechanisms of knowledge</b>	<b>10</b>	<b>92</b>
(1 4 1)	/hierarchy	18	223
(1 4 1 1)	/stovepipes	8	109
(1 4 1 2)	/integration, aggregation	7	77
(1 4 1 3)	/coordination, control	11	120
(1 4 1 4)	/power, authority	12	167
(1 4 2)	/social networks	10	121
(1 4 2 1)	/types of ties	0	0
(1 4 2 1 1)	/friendship, colleagues	6	49
(1 4 2 1 2)	/advice	8	140
(1 4 2 1 3)	/affect	3	54
(1 4 2 2)	/roles	4	34
(1 4 2 2 1)	/boundary spanner	7	53
(1 4 2 2 2)	/knowledge broker	6	174
(1 4 2 2 3)	/gatekeeper	6	58
(1 4 2 2 4)	/experience, expert	9	92
(1 4 3)	/group dynamics	10	123
(1 4 3 1)	/shared mental models	6	49

**Selective coding: core categories**

Node address	Node title	Documents coded <sup>48</sup>	Text units
(1)	/Theory	0	0
<b>(1 1)</b>	<b>/Knowledge sharing</b>	<b>0</b>	<b>0</b>
<b>(1 1 1)</b>	<b>/Exploration</b>	<b>0</b>	<b>0</b>
(1 1 1 1)	/trial and error	11	103
(1 1 1 2)	/exchange with other agencies	6	92
(1 1 1 3)	/integration, aggregation	7	77
(1 1 1 4)	/communication with the public	12	154
(1 1 1 5)	/meetings	14	132
(1 1 1 6)	/vision	13	240
(1 1 1 7)	/customer needs	11	179
(1 1 1 8)	/collaboration	10	148
<b>(1 1 2)</b>	<b>/Exploitation</b>	<b>0</b>	<b>0</b>
(1 1 2 1)	/steering committee, work groups	10	185
(1 1 2 2)	/strategy	7	73
(1 1 2 3)	/imitation	9	97
(1 1 2 4)	/coordination, control	15	174
(1 1 2 5)	/documents and databases	8	139
<b>(1 2)</b>	<b>/DGP process</b>	<b>0</b>	<b>0</b>
<b>(1 2 1)</b>	<b>/Conception</b>	<b>0</b>	<b>0</b>
(1 2 1 1)	/steering committee, work groups	10	185
(1 2 1 2)	/exchange with other agencies	6	92
(1 2 1 3)	/strategy	7	73
(1 2 1 4)	/vision	13	240
<b>(1 2 2)</b>	<b>/Implementation</b>	<b>0</b>	<b>0</b>
(1 2 2 1)	/trial and error	11	103
(1 2 2 2)	/integration, aggregation	7	77
(1 2 2 3)	/imitation	9	97
(1 2 2 4)	/meetings	14	132
(1 2 2 5)	/documents and databases	8	139

<sup>48</sup> Nodes that code 0 documents were created for organizing purposes only ('dummy nodes').

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# Curriculum Vitae

## Maria Christina Scharf

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### Education

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- 2000-2003 *University of St. Gallen, Switzerland.* Doctoral candidate in Business Economics, specialization in Public Management.
- 1998-1999 *University of St. Gallen, Switzerland.* Doctoral program in Business Economics, specialization in Operations Research.
- 1990-1996 *Bocconi University, Milan, Italy.* Master's Degree in Economics and Business Administration. Concentration in Management of International Corporations.
- 1994 *Vienna University of Economics and Business Administration, Austria.* Exchange program. Concentration in Economics and Law of the European Community.

### Research Experience

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- 2003-Present *Harvard University, John F. Kennedy School of Government, Cambridge, MA.* Postdoctoral Fellow.
- 2001-2003 *Harvard University, John F. Kennedy School of Government, Cambridge, MA.* Doctoral Fellow.
- 1999-2001 *University of St. Gallen, Institute for Public Services and Tourism.* Research Fellow.

### Professional Experience

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- 1997-1998 *Gruppo CLAS, Milan, Italy.* Research Associate.
- 1997 *International Road Transport Union, Brussels, Belgium.* Project Manager.
- 1996-1997 *European Commission, Brussels, Belgium.* Research Assistant.
- 1990-1994 *Siemens AG, Munich and Vienna.* Summer Intern.