JOINED-UP ICT INNOVATION IN GOVERNMENT

An analysis of the creation of eIDM systems from an Advocacy Coalition and social capital perspective

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GEZAMENLIJKE ICT INNOVATIES BIJ DE OVERHEID

Een analyse van de ontwikkeling van eIDM systemen vanuit een
'Advocacy Coalition' en sociaal kapitaal perspectief

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Before I started my PhD, several colleagues and acquaintances warned me that writing a PhD would be quite a solitary pursuit. An associate professor at Tilburg University asked me: 'Are you able to work in isolation and persevere? Are you really prepared to spend your evenings working on your thesis?' The idea (or rather nightmarish vision) I had of writing a PhD dissertation meant being cooped in a room, studying as if cramming for an exam. Luckily, nothing was further from the truth. Of course, there was a wealth of literature to review, often in the evenings and on weekends. But it was not compulsory reading; the subject had me in its grip, and I was keen to learn more and more. In addition, an empirically based PhD does not only entail literature research, but also applied, practical research. Together with my colleague Tijs van den Broek, I spoke to government practitioners in Graz, Helsinki, Valetta, Lahti, Vienna, Rabat, Brussels, Espoo, and tested the theory I had developed. This was a very exiting journey – visiting those places and meeting people there – in which I was primarily trying to unravel how government works. The study neither felt as a duty, nor as a solitary activity. The latter is confirmed by the long list of people I would like to thank for their support.

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1
Introduction

This chapter introduces the subject of this thesis – joined-up ICT innovation in the public sector. The first section demonstrates that scientists and policy makers fully agree that ICT innovation should be a joint effort involving multiple public sector actors. To solve today's urgent social problems, specific government agencies have to jointly rethink and improve practices – including their ICTs. However, as section two demonstrates, there are some severe barriers to joined-up ICT innovation. Evaluation studies consistently show that government agencies often fail to realize cooperative change. The third section provides a review of literature that attempts to explain the difficulties. The conclusion is that current public administration theories merely provide a fragmented picture of determining variables. The Advocacy Coalition Framework is introduced as it aims to overcome this theoretical fragmentation. The framework offers a broad overview of all kinds of factors that determine policy change. A confrontation between the variables of the model and innovation literature reveals strong similarities, which indicate that the model can also be applied to 'innovation'. The fourth section identifies a critique of the social subsystem of the model. Social capital theory is introduced in order to address this critique as it can contribute to the operationalisation of the Advocacy Coalition Framework and hence strengthen its explanatory value. In section five, the unit of analysis is confined to a specific joined-up ICT innovation, namely the joint development of electronic identification systems. Section six defines the central research question, which combines the key elements: (a) the difficulties of joined-up ICT innovations, (b) the use of the Advocacy Coalition Framework to explain those difficulties and (c) social capital theory to enhance the framework. The chapter concludes with the theoretical and social relevance of the study.

1.1 JOINED-UP MODELS OF ICT INNOVATION

Over the past few decades, joined-up or cooperative models of government have become the dominant "Leitbild" in public administration literature. Academic papers repeatedly underline the generic premise that in today's complex society governments will only be able to attain public value if their separate institutions increasingly cooperate (e.g. Pröpper, 2000; Fountain, 2001; McLaughlin et al., 2002; Peterson, 2003; Koppenjan and Klijn 2004; Goldsmith, 2004; Osborne and Brown, 2005). Goldsmith (2004:7) for instance argues: 'In many ways, twenty-first century

challenges and the means of addressing them are more numerous and complex than ever before. Problems have become more global and more local as power disperses and boundaries (when they exist at all) become more fluid. […] The traditional, hierarchical model of government simply does not meet the demands of this complex, rapidly changing age.'

According to several scholars a radical modernisation of government organisations is needed and various publications have accordingly explored and/or described new forms of networked government (Fountain, 2001; Goldsmith et al., 2004). Castells (1996) contends that new information and communication technologies create the potential for a shift towards more flexible, adaptive and interactive organisation systems and networks.[1] Edelenbos and Klijn (2007:25) state: 'It is not surprising that in public administration, many writers see a trend from government to governance in which public actors increasingly (have to) use more horizontal, instead of vertical, forms of steering and work together with other public actors and private actors in networks to achieve policy outcomes.' Moreover, in the past few years scientists increasingly identified new, user-generated forms of government in which public value is primarily delivered by citizens themselves.[2] There are increasingly examples in which citizens are empowered by ICTs to create public services which hitherto were provided by governments. An example is the online community PatientsLikeMe, consisting of patients who share personal healthcare data in order to gain an improved understanding of medical issues, such as the effects of certain medicine.[3]

Whereas some scholars predominantly focus on the fundamental reconsideration of organisation principles, others more specifically stress the need for the joint creation of Information and Communication Technologies (ICTs) by separate government agencies (e.g. Ling, 2002; Osborne and Brown, 2005; Burt and Taylor, 2006; Soeparman, 2006; Snijkers, 2006). According to these scholars government agencies should jointly rethink and improve ICTs – in other words, cooperatively conduct ICT innovations. Snijker (2006:54-5), for instance, argues that the joint development of an information architecture by Belgian social security agencies can enhance government efficiency and effectiveness and increase customer orientation. Soeparman et al. (2006:159-60) describe how the joint development of a novel information system by separate Dutch police forces can contribute to more effective policing and law enforcement. Huijboom and Van Staden studied

1 Years ago, Hayek (1945) already argued that traditional command and control organisations (e.g. government bureaucracies), face difficulties with the vast amount of information and knowledge needed to take well-considered decisions.

2 See Frissen et al. (2008), for example: 'Naar een "User Generated State?" De impact van nieuwe media voor overheid en openbaar bestuur', research commissioned by the Dutch Ministry of the Interior and Kingdom Relations, The Hague and Frissen (2010), 'Health 2.0, "It's not just about medicine and technology, it's about living your life,"' a background study published by the Council for Public Health and Health Care upon recommendation of 'Health 2.0', The Hague.

3 http://www.patientslikeme.com, See also Huijboom, N.M. et al, (2009), 'Public Services 2.0: The Impact of Social Computing on Public Services', edited by Punie, Y, Misuraca, G., Osimo, D., JRC-IPTS EUR 2408 EN, Luxembourg: European Communities.

the creation of a shared electronic patient record in the Andalusian healthcare sector and came to the conclusion that the new method of sharing data enhanced the quality of patient information (2005:25). Although several of these scholars emphasise that attention should be paid to the risks of increased cross-agency innovation and cooperation (e.g. privacy infringements) the large majority contends that future government organisations cannot innovate in isolation. The call for joined-up ICT innovations by scholars can be found in many public areas (e.g. healthcare, education, policing) in a variety of Western democracies and at various levels of government (e.g. national, regional and local). Hence, there seems to be a broad consensus among scholars on the need for joined-up ICT innovation.

This scholarly emphasis on joined-up ICT innovation is echoed in government policies. Strategic plans of several Western governments reveal a recurring demand for a cooperatively driven change of information and communication systems (e.g. Bekkers and Korteland; 2006, Driessen, 2006). Joined-up ICT innovation is often perceived by policy makers as a means to deal with fragmentation, government 'silos' and functional differentiation – notions that have a strong negative connotation (e.g. Snijkers, 2006). A widespread and well-known example of a policy encompassing joined-up ICT innovation (as part of a fundamental institutional reform) may be the 'online one-stop shop' (Hagen and Kubicek, 2000). Many Western governments have defined strategies to improve the provision of services by integrating products and processes of several government agencies into one virtual (or physical) office (ibid, p. 7). The examples of these policies are manifold. In the Netherlands, for instance, local governments formulated programmes to create digital one-stop shops for businesses, where entrepreneurs can obtain integrated services from (departments of) municipalities, chambers of commerce, the tax office, social security agencies and water districts.[4] In the UK, strategies have been launched to create 'online single points of contact' for parents of children with special needs.[5] In Australia programmes have been created to establish virtual one-stop shops for overseas businesses that wish to invest and trade in Australia.[6] Similar policies have been drafted in Austria, Belgium, Denmark, Finland, France, Germany, Italy and Spain as well (ibid.).

While many governments have formulated strategies for joined-up ICT innovations, evaluation studies show that they face substantial problems putting these policies into place. Illustrative in this respect may be the 'Overheidsloket 2000' (Government Office 2000) initiative in the Netherlands, which was introduced as early as in 1991 (initially under the name of 'Overheid Service Centrum').[7] The

4 For example, see http://www.antwoordvoorbedrijven.nl/, but also websites of municipalities, such as Groningen, http://gemeente.groningen.nl/ondernemen/bedrijvenloket, Eindhoven http://www.eindhoven.nl/ondernemersplein.htm and Amsterdam http://amsterdam.nl/ondernemen.

5 National Audit Office, (2001), 'Joining Up to Improve Public Services,' report by the Comptroller and Auditor General.

6 See http://newsroom.nt.gov.au/2004/20041022_ph_trade.shtml

7 The concept of OL2000 is described by the programme office OL2000 in several reports such as 'Het loket in volle gang', 'Tweede tussenbalans programma Overheidsloket 2000', 'Surfen in een hangplek', 'Digitaal vastgoedloket voor bedrijven'.

Overheidsloket 2000 programme embraced the concept of civic service centres; digital and physical service counters where citizens and businesses could receive integrated government services. In 2000 – after almost 10 years of pilots and broader implementation projects – there was only a very limited scale of integration of online (and offline) services (Kubicek, 2000:461-4). Researchers came to the conclusion that standardisation, legislation (as regards privacy, security, identification, etc.) and limited budgets were preventing organisations from ICT and process integration. After some more programmes and projects, today the Dutch government is still striving to achieve integrated online services, but up until now the results of these projects have been disappointing. The Ministry of Economic Affairs and the Ministry of the Interior stated in 2007 and 2008 in strategic policy reports that fragmentation continues to be a major problem in government services.[8] One of the high-priority actions for the future is, once again, the implementation of, as they referred to in these reports, online 'single-points-of-contact': digital counters where citizens can receive integrated services.

1.2 DIFFICULTIES WITH JOINED-UP ICT INNOVATIONS

A broader review of the literature reveals that not only 'one-stop shop' innovations meet substantial difficulties, but that more generally cross-agency cooperation seems to be problematic (e.g. Fountain, 2001; Moon, 2002; Chadwick and May, 2003; Edmiston, 2003; Osborne and Brown 2005; Edelenbos and Klijn, 2007). For example, Fountain (2001:67-9) argues that: 'Many networks are highly conflictual, mired in contractual disputes and lack of coordination' and that 'Despite these rationales for and determinants of networks, it has been shown that relatively few interorganisational networks succeed. Although rationality should lead to many forms of interorganisational networks, the failure rate of networks is reportedly high.' Edelenbos and Klijn (2007:25) state that it is difficult to achieve joint decision making among actors, as complex interorganisational networks are ambiguous and unpredictable. Moreover, Edelenbos and Klijn argue that decision making is hampered by the unwillingness of actors to share information as their control over other actors is limited and they fear opportunistic behaviour. Osborne and Brown (2005) contend that the plural state – a public sphere in which governments, non-profit and business sectors increasingly have to collaborate in the provision of public services – yields some important management challenges.

Literature on public sector ICT innovation endorses and further concretises the generally perceived collaboration problems (e.g. Van Venrooij 2000; Osborne and Brown, 2005; Thaens, 2006; Bekkers and Homburg 2007). For example, Bekkers and Homburg (2007:377) conclude that: 'An examination of recent assessments of the e-Government initiatives in general (Gartner, 2000; OECD, 2003) and the assessment of e-Government practices in Canada, the United Kingdom, Australia, and

8 Ministry of Economic Affairs, (2007), 'Nederland in Verbinding, de ICT Ambitie van Nederland',The Hague and Ministry of the Interior and Kingdom Relations (2008), 'Nationaal Uitvoeringsprogramma Dienstverlening e-overheid', Burger en Bedrijf centraal (Citizen and Business Central Services, The Hague.

the Netherlands show that the lack of cooperation between these back offices is still a major problem.' In a study on interorganisational electronic service delivery in the Netherlands, Van Venrooij (2000) demonstrates that the most important barriers to the integration of government back-office systems concern coordination problems due to an ambiguous distribution of tasks and legally defined competences among the back offices. The plurality of the actors, interests at stake and the lack of a common vision or sense of urgency about the necessity to join forces prevent separate institutions from cooperation. Thaens et al. (2006:95), who studied networked computerisation in the Dutch social security sector, identified several barriers to effective collaboration between involved stakeholders. Critical problems were the uncertainty on the division of responsibilities, the lack of a shared perspective on the advantages and necessity of information sharing, and mutual distrust between stakeholders.

In addition, European evaluation, status quo and benchmark studies reveal that – compared to ICT innovations, which concern merely one organisation, joined-up ICT innovation seems to demonstrate a lack of progress. For instance, whereas e-Government benchmarks indicate that member states are making significant progress in the sophistication of online central services (offered by a sole organisation), member states seem to be struggling with the development of so-called 'service clusters' (jointly offered services by separate organisations). Both in 2007 and 2009, European comparative e-Government studies[9] showed that service clusters in particular had a low performance level (relatively low sophistication and low availability). In 2007 (European Commission Benchmark 2007:18), it was stated in the benchmark report that service clusters (compared to the single services of one central provider) are typically offered by multiple providers, whose setting is more heterogeneous and complex and one of the key reasons for significantly slower progress. The European Commission came to the more general conclusion in another 2007 report that despite comprehensive policies and substantial investments in several countries, government projects that attempted to streamline or integrate processes revealed serious deficiencies in the process.[10]

1.3 THE ADVOCACY COALITION FRAMEWORK AS EXPLANATORY MODEL

Although several researchers have been occupied by the question which barriers hamper joined-up ICT innovation in government, a complete answer to this question has not been found yet. It seems that, although some important pieces of the complex puzzle have been identified, some crucial elements of the explanation are still missing. The question of initiatives that fail to cooperatively realise change

9 European Commission, (2007), 'The User Challenge, Benchmarking The Supply Of Online Public Services', 7th Measurement, Brussels, and European Commission, (2009), 'Smarter, Faster, Better e-Government', 8th Benchmark Measurement, Brussels.

10 European Commission, (2007), 'European e-Government 2005-2007: Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels.

has predominantly been approached from an institutional or technological viewpoint. Explanatory models that have been used to describe obstacles are often highly technologically, organisationally or regulation-oriented (Heeks, 1999; Ho, 2002; McClure, 2000; Lam, 2005; Ebrahim and Zahir, 2005; Gilbert and Balestrini, 2004). Frequently mentioned barriers include:

- Fragmented technical infrastructure (e.g. the lack of electronic data exchange between agencies, lack of standards and integrated platforms;
- Limited budgets;
- Existing fragmented structure (functional differentiation);
- Management of the project (failing leadership, missing ownership, lack of implementation guidance);
- Lack of or inflexible legislation (e.g. digital signature legislation, privacy legislation).

Moreover, a review of literature reveals that theories on drivers and barriers for joined-up ICT innovation in the public sector are highly fragmented while dispersed between scientific disciplines. A large body of literature is available, for example, in the field of technology, which focuses on the joint development of technological standards by separate organisations and the realisation of interoperability between distinct information systems (e.g. Mori et al., 1998; Guijarro, 2007; Pirnejad et al., 2008; Gottschalk, 2009; Peristeras et al., 2009). Technological barriers that are repeatedly mentioned concern the incompatibility of architectures, platforms and infrastructures. Furthermore, a great deal of public administration literature emphasises managerial and organisational factors (e.g. Allen et al., 2001; Kinder, 2002; Dawkins, 2006; Grant et al., 2007; Klievink et al., 2009). Several scientists mention institutional barriers and stress the need for growth models, the redesigning of processes and new governance structures. Managerial factors that are often mentioned are failing leadership, ambiguous responsibilities and lack of coordination. In the legal area, numerous scholarly papers have identified regulatory challenges, such as privacy threats, liability and accountability issues (e.g. McMillen, 2004; Roberts, 2004; Sarathy, 2006; Clarke, 2009).

However, in order to gain a more comprehensive understanding of what hampers joined-up ICT innovation in the public sector, an overarching model which integrates several variables is needed. Although public sector innovation literature provides several models that identify multiple variables (e.g. Osborne and Brown, 2005), generic models that integrate a broad spectrum of factors while cross-cutting scholarly disciplines are scarce. A model that does capture a large variety of factors is Sabatier's Advocacy Coalition Framework (e.g. 1993, 1996, 2007). The model consists of economic, cultural, sociological, political, technological, legal and institutional factors that affect policy change. It reveals, for example, the constraints to policy change generated by systemic governing structures, fundamental value systems and legal arrangements. Although the model's unit of analysis is 'policy change', it can also be applied to 'innovation', as factors mentioned in innovation literature are largely consistent with factors captured by the framework (similar factors are mentioned by e.g. Pollit and Bouckaert, 2000; Peled, 2001; Osborne and Brown, 2005; Loos, 2006; Schedler and Proeller, 2007). More-

over, policy change can be perceived as a specific type of innovation (and thus change), namely a government's change of strategy.

Another reason why the Advocacy Coalition Framework is suitable for studying joined-up ICT innovation is that it focuses on network – more precisely coalition –structures and thus uses a multi-stakeholder perspective. Various empirical studies have demonstrated that the framework is appropriate for explaining complex, multi-actor changes and thus for investigating processes of cross-agency innovations (see, for instance, Parsons, 1995; Eberg, 1997; Schlager and Blomquist, 1996; Grin and Hoppe, 1997; Fenger and Klok, 2001). In particular the socio-cultural variables addressed by the framework may uncover mechanisms that influence joined-up ICT innovation. A dominant element of the framework is the subsystem – a network of actors who form coalitions, share certain values and beliefs and can broker between diverse groups. The social dynamics within the subsystem may yield new insights into barriers and incentives for joined-up ICT innovation since these more sociological factors are often underexposed in traditional public administration literature.

1.4 SOCIAL CAPITAL THEORY AS AN ENHANCEMENT OF THE ADVOCACY COALITION FRAMEWORK

A study of the application of the Advocacy Coalition Framework, however, also reveals that there are some limitations to the use of the model (Malony, 1994; Schlager, 1995; Kim et al., 2008). Most critics mention the need for the further operationalisation of the subsystem as the dynamics within and specific characteristics of the subsystem (e.g. the type and strength of relationships, level of trust and sharing of values between actors) have been defined rather abstractly and thereby remain vague. An important objection to the framework is that it fails to distinguish between the more important and less important policy actors in a given policy area because it neglects the distinction between insiders and outsiders. Another criticism shared by several scholars is the framework's inability to account for the possibility that a policy domain may be structured by harmonious and stable relationships among actors. Both objections point to the need for a further operationalisation of involved participants and their relationships.

A theory which provides this operationalisation is social capital theory (e.g. Bourdieu, 1983; Fountain, 2001; Lin, 2001; Klijn, 2002). Social capital can be understood as the whole of an individual's durable social connections and the potential benefits that may be gained through these social connections (such as access to finance, knowledge and power, e.g. Bourdieu, 1983). Obviously, people's social capital is not restricted to the organisation they work for; they have ties with people inside and outside the organisation. Funding, knowledge, expertise, but also opinions, values, decision power and ideas can flow between connected people. The characteristics of the relationships between actors (e.g. type of relationship, strength of the tie, level of trust) affect the intensity and type of collaboration between actors and subsequently may stimulate or hamper certain flows of resourc-

es (e.g. Fountain, 1997). Huijboom and Van Staden (2005), for instance, found that general practitioners involved in a collaborative development of an electronic patient record, used their personal strong ties with hospital physicians to influence opinions and to gain access to powerful decision makers. The reciprocate flow of opinions, influence, trust and the brokerage of healthcare professionals between separate groups highly determined the outcome of the joint initiative.

Overall, it seems that social capital theory can bring the Advocacy Coalition Framework one step further as it takes social factors into account, not only at a subsystem level, but also at a relational and individual level. In addition, social capital theory reveals the social dynamics at play within the subsystem over time. Social capital theory demonstrates that resources flow between actors, that positions within the network change constantly, that new relationships are built and that others fade. The Advocacy Coalition Framework, meanwhile, considers the subsystem to be rather stable, and yet it reinforces social capital theory by explaining the context in which cross-agency collaboration takes place. The Advocacy Coalition Framework does not only identify socio-cultural factors, but also economic, legal and technological factors, for example. Consequently, the conceptual model applied in this research integrates the Advocacy Coalition Framework and social capital theory, which is be further elaborated on in the next chapter.

1.5 CONFINING THE UNIT OF ANALYSIS

The general concept of 'joined-up ICT innovations' is too broad to be studied in one PhD research. To be able to draw valid conclusions about factors that influence joint ICT innovation processes, a more specific unit of analysis has to be defined. The subject of this thesis is a particular type of joined-up ICT innovation, namely the cooperative development of an electronic Identity Management (eIDM) system used by various individual government institutions. An eIDM system is a tool for electronically and officially proving one's identity during his/her interaction with businesses or governments. It enables end-users to access secured databases (e.g. bank accounts), to sign electronic documents (e.g. tax forms) and to obtain digital products (e.g. building permits). eIDM systems are the selected joined-up ICT innovation in this research paper since many governments trumpet the virtues of eIDM systems as key enablers for advancing electronic service delivery to citizens and businesses in the coming years.[11] The development of a national eIDM system can be perceived as a joint process since in many countries separate government institutions collaborate to develop one eIDM solution for all e-Government services. In addition, the development of an eIDM system can be perceived as an innovation as it entails the development, introduction and incorporation of (a set of) new information and/or communication technologies,

11 See, for instance, European Commission, (2007) 'European e-Government 2005-2007, Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels, and European Commission, (2009), 'i2010 e-Government Action Plan Progress Study', Brussels.

which over time will represent a substantial break with the past.[12] Although eIDM technologies have already been developed in the private sector, the application of those systems in the public sector requires further technological development. The implementation of eIDM systems results in a substantial break with the past since it necessitates changes in legislation, skills, processes and products.

1.6 RESEARCH QUESTION

The aim of this research is to gain a better understanding of the occurrence of joint ICT innovations – more specifically the development of eIDM systems – in the public sector by means of an integrated model of the Advocacy Coalition Framework and social capital theory as a theoretical lens. This central research goal can be subdivided into three research objectives:

- To develop a conceptual integrated framework of advocacy coalition and social capital factors that influence the occurrence of joined-up ICT innovations – namely eIDM systems – in the public sector;
- To test and further develop the conceptual framework by applying it to concrete cases of joined-up ICT innovations, namely the development of eIDM systems in the public sector;
- To reflect on the existing Advocacy Coalition Framework and social capital theory, and to provide recommendations for further academic research and for policy makers.

The following overall research question can be defined to meet these goals:

How can an integrated model of the Advocacy Coalition Framework and social capital theory explain the occurrence of joined-up ICT innovations – in particular eIDM systems – in the public sector?

This central research question can be divided into the following sub-questions:

- Combination of the Advocacy Coalition Framework and social capital theory in a new explanatory framework:

1. How can the Advocacy Coalition Framework be used to explain the occurrence of joined-up ICT innovations in the public sector?
2. How can social capital theory be used to explain the occurrence of joined-up ICT innovations in the public sector?
3. How can the Advocacy Coalition Framework and social capital theory be integrated into one model that explains the occurrence of joined-up ICT innovations in the public sector?

- Application of the explanatory framework in tangible cases:

4. How can the integrated model explain concrete cases of the occurrence of joined-up ICT innovations, namely the development of eIDM systems in the public sector?

12 For a typology of public sector innovations see e.g. Thaens (2006) and Bekkers et al. (2006).

5. How do the variables of the integrated model become manifest in concrete cases of the occurrence of joined-up ICT innovations, namely the development of eIDM systems in the public sector?

- Reflections on the explanatory framework:

6. Which conclusions can be drawn regarding the usefulness of the integration of the Advocacy Coalition Framework and social capital theory?
7. Which scientific recommendations can be made regarding the further development of the Advocacy Coalition Framework and social capital theory?
8. Which policy recommendations can be made regarding the creation, implementation and diffusion of joined-up ICT innovations in the public sector?

The research is divided into three main parts; a theoretical and methodological part (chapters 2, 3 and 4) in which research questions 1 to 3 are addressed. An empirical part (chapters 5 to 8) in which research questions 4 and 5 are answered. And a reflective part (chapter 9) in which research questions 6 to 8 are addressed.

1.7 SOCIAL AND SCIENTIFIC RELEVANCE OF THE RESEARCH

The scientific relevance of this research lies in its contribution to the further development and integration of the Advocacy Coalition Framework and social capital theory. The research yields an integrated model of these concepts that is tested and reflected upon by means of eIDM innovation cases in the public sector. Although the study is practically oriented, the acquired knowledge from case studies will be valuable for public administration. The Advocacy Coalition Framework – a dominant theoretical model in public administration literature – is further operationalised by means of social capital theory. Thereby, critique to the model is addressed (e.g. Maloney et al, 1994, Kim and Roh, 2008). In addition, social capital theory is examined and structured, and theoretical propositions are empirically tested. As stated in previous sections, social capital theory is relatively recent; as yet, there is no clear-cut answer as to how social capital variables affect innovation, let alone joined-up ICT innovations in government (e.g. Franke, 2005; Kasaa, 2007; Nooteboom, 2009). This research tries to gain more insight into the mechanisms of social capital in specific situations of public sector innovation. The aim of integrating the Advocacy Coalition Framework and social capital theory is not to deliver a generic model for innovation in the public sector. As the theoretical framework is used in a limited number of cases, no statements can be made about the general implications and application of the model (Leeuw, 1999:186-7). Nonetheless, the integrated model will stimulate the further development of a more generic model to explain joined-up innovations in government.

The study has social relevance because it seeks to provide insight into a variety of obstacles that hamper government innovations. An improved understanding of the manifestation of social factors has particular added value, since these factors often remain underexposed in public sector literature (e.g. Considine, 2009). The research exposes the social processes that can hamper or drive specific innova-

tions, and it shows managers and professionals of government agencies how to influence these social processes. The chance to influence innovation projects is particularly relevant now that several studies have indicated that the returns on investments in ICT innovations in the public sector are limited. In the Netherlands, the National Audit Office, for instance, stated in their 2007 report 'Lessen voor ICT projecten bij de overheid' that many ICT innovations in government fail to succeed. The disinvestment in ICT projects is estimated at four to five billion euros per year.[13] The more governments are able to realise the initial goals of technological innovations (such as increased efficiency, effectiveness, customer satisfaction or democratic participation), the lower the costs for society. In addition to this economic argument, successful innovations by governments build the trust of citizens and entrepreneurs in government.[14] Since people's trust in government is declining rapidly, effective innovation projects can promote a positive image of government, which – in turn – may stimulate citizen engagement in the public domain.

1.8 STRUCTURE OF THE THESIS

Chapter two explores in more detail the theories introduced in this chapter and incorporates them into a single theoretical framework which can be used to explain joined-up ICT innovations in the public sector. It presents theoretical propositions based on a broad review of literature related to the Advocacy Coalition Framework and social capital theory. Chapter three explores the specific 'joined-up ICT innovation' case to test the integrated model, namely the joint creation of an eIDM system. This chapter also examines the perceived need for eIDM systems, the status quo of these systems in European member states and the key barriers for eIDM implementation. Chapter four outlines the methodology for testing the integrated framework. This chapter argues, in particular, that a multiple case-study research design can generate more insight into the factors that affect joined-up ICT innovations in the public sector. Furthermore, this chapter also provides a selection of cases to empirically examine the tenability of the integrated framework. Chapters five to eight describe the joint development of eIDM systems by government agencies in Austria, Belgium, Finland and Malta, respectively. Each of these chapters explains the chronological events in the innovation process, the influence of the Advocacy Coalition Framework's parameters and events, and the impact of social capital variables. The thesis ends with the conclusions presented in chapter nine. This last chapter provides a cross-case analysis of the influence of the framework's factors applied in the cases and evaluates the validity of the theoretical propositions. The final sections of the concluding chapter define research challenges and policy recommendations.

13 Nationale Rekenkamer, (2007), 'Lessen voor ICT projecten bij de overheid', Den Haag.
14 See, for example, Barnes (2000) and Moon (2003).

2

The Advocacy Coalition Framework and social capital: a theoretical lens

This chapter explores in more detail the two theories introduced in the first chapter – the Advocacy Coalition Framework and social capital theory – and incorporates them into a single theoretical framework that can be used to explain joined-up ICT innovations in the public sector. The proposition is that social capital theory can contribute to enhance the explanatory power of the Advocacy Coalition Framework. The criticism of several scientists on the framework (e.g. Maloney et al., 1994; Cairney, 1997; Kim, 2008) shows that one of the most important limitations of the Advocacy Coalition Framework is that it does not reveal the micro-dynamics of policy subsystems. Here, social capital theory has added value when it unravels and explains the mechanisms and characteristics of relationships between members of policy coalitions. In the first three sections of this chapter, the Advocacy Coalition Framework will be described and its main limitations will be reviewed. The fourth to sixth sections explain social capital theory and the dominant connections between the Advocacy Coalition Framework and social capital theory. The seventh section consolidates the two theories and presents an integrated analytical model that can be used to study the occurrence of joined-up ICT innovations. The chapter concludes with theoretical propositions which will be empirically tested in chapters five to eight.

2.1 THE ADVOCACY COALITION FRAMEWORK

The Advocacy Coalition Framework is a conceptual model that explains stability and policy changes within a policy subsystem that have occurred over a decade or longer (Sabatier, 1993; Sabatier and Weible, 2007; Kim et al., 2008). Sabatier and Jenkins-Smith introduced the framework in the early 1990s, and since its introduction the model has been applied in many studies (Sabatier and Weible, 2007:190). According to Sabatier, the framework has at least four basic premises (Sabatier, 1993:16):

> […] (1) that to understand the process of policy change – and the role of policy-oriented learning therein – requires a decade or more; (2) that the most useful way to think about policy change over such a time span is through a focusing on "policy' subsystems", that is, the interaction of actors from different institutions who follow and seek to influence governmental policy decisions in a policy area; (3) that those subsystems must include an

intergovernmental dimension, that is, they must include all levels of government (at least for domestic policy); and (4) that public policies (or programs) can be conceptualized in the same manner as belief systems, that is, as sets of value priorities and causal assumptions about how to realize them.

The Advocacy Coalition Framework emphasises shared 'belief systems' as the core drivers behind coalitions, the 'role of information and learning' as a motivator of policy change, and the role of the 'policy broker' in mediating between conflicting coalitions (Sabatier, 1999; Schlager and Blomquist 1996). The following figure presents Sabatier's general overview of the framework (Sabatier and Weible, 2007:202):

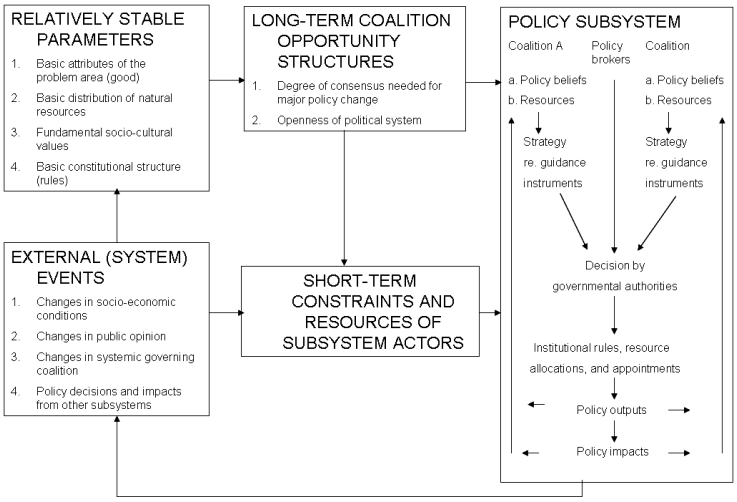

Figure 1. Advocacy Coalition Framework, Sabatier and Weible, 2007:202

The central line of reasoning underlying the model is that policy making occurs among specialists within policy subsystems (right box, figure 1), but that the behaviour of specialists is affected by factors in the broader political and socio-economic system (left boxes). Relatively stable parameters (left upper box), such as fundamental socio-cultural values, affect external events (left lower box), such as changes in public opinion. The relatively stable parameters also affect the long-term coalition opportunity structures (central upper box), i.e. the institutional structures that provide windows for coalition formation. For instance, basic constitutional rules shape the institutional structures (e.g. degree of consensuality of the democratic system), which in turn impact opportunities for coalition formation. Both the long-term coalition opportunity structures and the external events yield short-term constraints and resources of actors (central lower box), which in turn affect the policy subsystem. The elements (boxes) of the Advocacy Coalition Framework will be further elaborated upon in the following sections.

Sabatier et al. argue that 'policy making in any political system or policy subsystem is affected by a variety of social, legal and resource features of the society of which it is part' (Sabatier, 2007:191). These features can be *relatively stable parameters* or more dynamic *external events*. Sabatier and Jenkins-Smith recognise four stable parameters, namely (Sabatier and Jenkins-Smith, 1993:20):

1. Basic attributes of the problem area (or 'good'). Various characteristics of goods, such as excludability, affect institutional (policy) options. As Sabatier and Jenkins-Smith argue (ibid, p.20): 'For example, ocean fisheries and large underground aquifers give rise to common pool problems that markets cannot deal with efficiently and that make them candidates for government regulation (Ostrom, 1990).'
2. Basic distribution of natural resources. Sabatier and Jenkins-Smith (ibid, p. 21) note that: 'The distribution of natural resources strongly affects a society's overall wealth and the viability of different economic sectors, many aspects of its culture, and the feasibility of options in many policy areas.'
3. Fundamental cultural values and social structure. A country's dominant cultural values and social structure affect policy options. Sabatier and Jenkins-Smith (ibid, p.21) explain this parameter by stating that, for instance, 'large-scale nationalisation of the means of production is a viable policy option in many European countries, but not in the United States.'
4. Basic legal structure. In most political systems, basic legal norms are quite resistant to change and affect the extent of policy-oriented learning, and thus change.

The external events that Sabatier and Jenkins-Smith distinguish are:

1. Socio-economic conditions and technology. Sabatier and Jenkins-Smith (ibid, p.22) contend that: 'Changes in these areas can substantially affect a subsystem, either by undermining the causal assumptions of present policies or by significantly altering the political support of various advocacy coalitions.'
2. Changes in public opinion (this parameter has been added in more recent publications, e.g. Sabatier and Weible, 2007:202). Swaying public opinion can affect the willingness of politicians and policy-makers to make certain decisions.
3. Systemic governing coalitions. Sabatier and Jenkins-Smith (ibid, p.22) argue that: 'Changes in the dominant coalition at a given level of government, i.e. 'critical elections' (Burnham 1970), normally require that the same coalition controls the chief executive's office and both houses of legislature. Such changes in the system-wide governing coalition are quite rare.'
4. Policy decisions and impacts from other subsystems. A subsystems is not fully autonomous (ibid, p.23); it may be significantly impacted by the decisions and strategies from other policy sectors (e.g. the federal strategy of the United States in the 1970s to become 'energy independent' substantially impacted the policies of some local subsystems).

The *relatively stable parameters* change within a decade or so and thus rarely provide the direct impetus for behavioural or policy change within a policy

subsystem (Sabatier and Weible, 2007:193). They are, however, very important in establishing the overall socio-economic context within which subsystems must operate; a more wealthy society, for instance, may have more resources for a certain policy than a less prosperous society. The relatively stable parameters more directly affect the long-term coalition opportunity structures. Long-term coalition opportunity structures are determined by the relatively stable parameters in the sense that fundamental values and basic constitutional structures provide a basic set of (e.g. legal and ethical) rules for coalition formation. For instance, in Westminster democratic systems, where decision making is rather centralised, there may be less incentives to form a coalition. In addition, the relatively stable parameters affect external events because basic socio-economic structures, values and legislation may contribute to the cause of an external event. For instance, the rules of a financial system may contribute to a crisis within the financial system.

Whereas stable parameters generally are not a direct incentive for policy change, *external events* can shift agendas, focus public attention and attract the attention of key decision makers (Sabatier and Weible, 2007:199). The most important effect of external shocks to the system is the redistribution of resources or the opening and closing of venues within a policy subsystem, which can lead to the replacement of a dominant coalition by another coalition (Sabatier and Jenkins-Smith, 1993). Several external events may take place simultaneously and together form a strong driver for the reallocation of resources and subsequently put pressure on existing policy subsystems. For instance, when the internet bubble burst, it affected the opinion of professionals and the public about investments in the emerging internet economy and subsequently also the allocation of (financial) resources. This, in turn, affected the existing policy beliefs on internet-based economic models.

As a set of variables that affects the subsystem and its constraints and resources, the *long-term coalition opportunity structures* have not always been part of the Advocacy Coalition Framework. This category of variables was added to the model in 2007 by Sabatier and Weible (2007:1999) to address the criticism that the model was too much of an American pluralist product with empirical origins. The coalition opportunity structures mediate between stable system parameters and the subsystem and consist of two variables (based upon Lijphart, 1999), namely: 'degree of consensus needed for major policy change' and 'openness of the political system'. In general, the higher the degree of consensus required, the more incentive coalitions have to be inclusive (rather than exclusive), to seek compromise and share information with opponents and generally to minimise devil shift.[15] The argument holds that in centralised corporate regimes (contrary to more decentralised countries), participation is restricted to a small number of central authorities. To summarize (Sabatier and Weible, 2007:200), pluralist coalition opportunity structures tend to have moderate compromise norms and open-

15 A devil shift is, according to Sabatier and Weible (2007:194), 'the tendency for actors to view their opponents as less trustworthy, more evil and more powerful than they probably are' (see also Sabatier, Hunter, and McLaughlin, 1987 and Sabatier and Jenkins-Smith, 1999).

decision systems. Westminster systems tend to have weak compromise norms and relatively restricted participation norms.

The *short-term constraints and resources of the subsystem actors* affect the dynamics within the subsystem in the sense that constraints may hamper, and a certain resource allocation may support or hinder, a certain policy change. Although most research focuses on the operationalisation of the content of the belief systems (Sabatier and Weible, 2007:201), Sewell (2005) and Weible (2005) have explored possible coalition resources. Based on these explorations, Sabatier and Weible (2007:201) present a typology of policy-relevant resources that actors can use to influence public policy. The six types of resources they distinguish are: formal legal authority to make policy decisions, (supportive) public opinion, information, mobilisable troops (members of the attentive public who share the beliefs of the actor), financial resources and skilful leadership. However, Sabatier and Weible argue that even though these resources can be conceptualised rather easily, operationalising them and then aggregating them across resource types has proven to be extraordinarily difficult (2007:203-4).

Within the *policy subsystems*, actors can be aggregated into a number of advocacy coalitions composed of people from various governmental and private organisations who share a set of normative and casual beliefs and who often act in concert (Sabatier and Jenkins, 1993:18). According to Sabatier et al. (Sabatier and Weible, 2007), the set of policy participants includes not only the traditional 'iron triangle' of legislators (Heclo 1978; Kingdon 1995), agency officials and interest-group leaders, but also scholars and journalists who specialise in specific policy areas. At a certain moment in time, several coalitions adopt a strategy envisaging one or more institutional changes that members feel will progress policy objectives. Conflicting strategies from various coalitions are normally mediated by a third group of actors – termed 'policy brokers' by Sabatier – whose main concern is to reach a compromise that will reduce conflict within the subsystem. These social processes result in decisions by government authorities that yield specific rules, resource allocations and appointments, which, in turn, produce policy outputs at the operational level. These outputs have a variety of impacts on the identified problems as well as various side effects.

Sabatier and Weible (2007:194) underline several fundamental assumptions regarding the interaction between actors of the policy subsystem. Firstly, they stress the difficulty of changing *normative beliefs* and the 'tendency for actors to relate to the world through a set of perceptual filters composed of pre-existing beliefs that are difficult to alter.' According to Sabatier and Weible, actors from different coalitions are likely to perceive the same information in very different ways, leading to distrust. Actors tend to view their opponents as less reliable, more evil and more influential than they probably are, a phenomenon Sabatier and Weible call the 'devil shift' (ibid, p. 194). This, in turn, intensifies ties with members of the same coalition and exacerbates conflict across competing coalitions. The framework conceptualises a three-tiered hierarchical belief structure. At the broadest level are deep core beliefs, very general normative and ontological assumptions, for instance, about the prior-

ity of fundamental values such as liberty and equality. At the next level are policy core beliefs, which, for example, entail beliefs regarding the proper role of government. The third level consists of secondary beliefs that are relatively narrow in scope, and address, for instance, detailed rules and budgetary applications within a specific programme. Although normative beliefs are very resistant to change,[16] Sabatier et al. (ibid, p. 204) argue that internal shocks to the subsystem (e.g. a major corruption incident) in particular may substantially affect policy beliefs.

The process of policy change is iterative in the sense that the implemented policy may impact external events and this, in turn, will impact the constraints and resources of the subsystem actors and the dynamics within the policy subsystem. For instance, a certain policy impact (e.g. limited reduction of carbon emission) may affect public opinion (e.g. attention to effectiveness of environmental policy instruments) and this, in turn, may affect the constraints and resources of subsystem actors (e.g. investments in new environmental programmes) and subsequently the policy subsystem (change of policy priorities).

2.2 THE ADVOCACY COALITION MODEL AND JOINED-UP ICT INNOVATIONS

Although Sabatier's model explains the occurrence of *policy change* in the public sector, it goes far to clarify the occurrence of *joined-up ICT innovations* in government as well. ICT innovation can be perceived as a *specific type* of policy change, namely the development of a programme to apply a new information and/or communication technology and the implementation of the new technology.[17]

Moreover, the *central premises* of the Advocacy Coalition Framework can be found in literature on ICT innovation. Perez (2003), for instance, contends that the process and impact of ICT innovations can only be studied if the technology has been introduced, developed and implemented for at least some decades – a hypothesis that is in line with Sabatier's first basic premise (see previous section).[18] Other basic premises can be traced back to innovation literature as well. For example, there is a rapidly growing body of literature which points to the diversity of stakeholders involved in government innovation processes (see, for example, Peled, 2001; Loos, 2006; Termeer, 2006; Thaens, Bekkers and Van Duivenboden, 2006). This finding is in line with the second and third premise of the Advocacy Coalition Framework, which argue that policy change should be perceived through policy subsystems in which various actors from different institutions and levels of government par-

16 Sabatier and Weible (2007) argue that deep core and policy belief are more resistant to change than secondary beliefs, which are much narrower.

17 See also Considine, M. et al. (2009): 'We have considered innovation to be a characteristic form of policy development and governance, […].'

18 Perez argues that institutionalised behaviour and structure change slowly. New institutionalism claims that radical transformation only occurs as a result of comprehensive external shocks, performance crises or large gaps between existing structures and underlying realities.

ticipate. The last premise of the Advocacy Coalition Framework – that policy can be conceptualised as belief systems (a set of value priorities and assumptions on how to realise them) – can in particular be found in literature on culture and innovation. Various studies perceive certain institutional innovations (e.g. new public management reforms) as a cultural phenomenon, in other words as a reflection of the socio-cultural values of the actors involved in the innovation process (see for instance Schedler and Proeller, 2007, but also Rogers, 1995).

In addition, various *socio-economic parameters* identified by Sabatier have been recognised in innovation literature. Rogers (1995:222) speaks of the perceived attributes of innovation as a parameter for innovation adoption. According to Rogers, perceived attributes of innovation, such as relative advantage, compatibility and complexity, are among the variables that determine the innovation adoption rate. This is largely in line with the Advocacy Coalition Framework's assumption that basic attributes of the problem (or policy) area affect policy options and subsequent change. The influence of fundamental cultural values and social structures (the third parameter of the framework) on innovation processes has in particular been described in innovation adoption literature (e.g. Waarts and Everdingen, 2005; Erumban and De Jong, 2006; Steers et al., 2008). Several scientists have argued that innovation adoption depends on a country's fundamental cultural values. The fourth parameter of the framework – the basic legal structure – can also be found in innovation literature. Legislation as obstruction to innovation is mentioned by Pollitt and Bouckaert (2000:34) who argue that innovation may require a change of existing legislation, which takes time and could thus form an obstacle to innovation.

Finally, several of the Advocacy Coalition Framework's external events have been mentioned as determining variables by innovation scientists. Pollitt and Bouckaert (2000:25-7), for instance, mention socio-economic forces (the first external event identified by Sabatier et al.) as dominant variables for innovation.[19] Entman (1997) comprehensively describes the effects media and changes in public opinion may have on innovation processes – the second external event of the framework. In addition, Pollitt and Bouckaert (2000) mention pressure from citizens as an event which may affect innovation processes. Pollitt and Bouckaert (ibid, p. 31) also recognise changes to systemic coalitions – the third external event – as an important factor that may influence (institutional) innovation processes. They contend that political parties have certain ideas that may affect the direction, development or implementation of an innovation. For example, a party may decide to reduce bureaucracy through institutional innovation. In conclusion, almost all premises and parameters of the Advocacy Coalition Framework can be found in innovation literature.

An important reason to use the Advocacy Coalition Framework to analyse innovation processes is that it adds value to existing innovation literature. This added

19 Considine, M. et al., (2009:30) also point to several external pressures for innovation, including socio-economic changes.

value is threefold, namely: (1) the integration of the above-mentioned variables into one model, (2) the intergovernmental dimension and (3) the focus on the social dynamics in the subsystem. Whereas other theories use a limited set of variables and therefore are merely capable of explaining part of the change process, the Advocacy Coalition Framework tries to capture all (whether sociological, political or economic) variables and thereby provide a full picture of factors that determine the change process. Furthermore, the focus of the Advocacy Coalition Framework is on intergovernmental interaction and therefore formal institutional borders of organisations do not constrain the explanation of the occurrence of change (as is the case in other theories). The Advocacy Coalition Framework uses a network perspective and is therefore able to reveal the effect of interaction between actors from different agencies on the occurrence of change. And, the third added value of the model is that social dynamics in subsystems is the central factor to explain change – a factor that is mentioned in innovation literature though it does not play a central role in it (see Edelenbos and Klijn, 2007:27, for example).

2.3 LIMITATIONS OF THE ADVOCACY COALITION FRAMEWORK

Even though the Advocacy Coalition Framework has proven to be very valuable for studying change in policy networks, it has also received some fundamental criticism (see the comprehensive review by Kim and Roh, 2008). Firstly, several scholars, such as Maloney et al. (1994), argue that the Advocacy Coalition Framework fails to distinguish more important from less important actors in a given policy area because it ignores the distinction between insiders and outsiders in coalitions. In addition, the Advocacy Coalition Framework does not account for the possibility that a policy domain may be structured by harmonious relationships among participants, as the iron triangle (a popular concept which shows the solid relationships among congressional committees, government agencies and interest groups) and policy community concepts (stable and close relationships among policy actors) demonstrate.[20]

Fundamental criticism was also voiced by Schlager (1995) who contends that the Advocacy Coalition Framework fails to identify 'collective action' problems. Even in cases in which members of the subsystem face substantial conflicts of interest, the Advocacy Coalition Framework assumes highly coordinated actions of the coalition members. Kim et al. (2008:657) argue that: 'Members of a coalition may not share the same benefits or the same costs, thus they may experience conflict in deciding on their collective action.' In addition Kim et al. (ibid, p. 657) argue that 'even though the actors in a coalition cooperate over time, the Advocacy Coalition Framework ignores the factors that lead coalition members to coordinate their activities. As some scholars have indicated, coordinated behaviour among policy

20 See, for example, Marsh, (1998) and Rhodes, (1990). As the term 'community' implies, the relationships are best characterised by closed village communities knitted together by such things as confidence and common calculations.

actors may require preconditions such as shared norms, mutual trust, respect and interdependency.'[21]

Lastly, several scientists argue that by focusing on belief systems the Advocacy Coalition Framework disregards coalitions between actors with different beliefs systems (Kim et al., 2008). The hierarchy of belief systems in the framework implies that there cannot be a coalition between two subsystem members who do not share deep core and policy core beliefs. However, empirical studies yield various examples of coalitions consisting of members with different belief systems. Research conducted by Cairney (1997), for instance, demonstrates that both feminists and conservative politicians – who did not share deep core beliefs - joined a coalition to regulate the availability of pornography (see also Hann, 1995). In addition, Kim et al. argue that: 'Major issues among coalitions may lie in secondary aspects of beliefs, not in their deep core or policy core beliefs.' In cases in which actors share deep core and/or policy beliefs, they may still join different coalitions due to differences in secondary beliefs. For instance, when governmental agencies and material interest groups are involved, deep core beliefs may not be stable enough to guide the selection of policy core and secondary beliefs. Involved parties may perceive their policy interests as more important than their core beliefs (e.g. see Knoke and Pappi, 1996 and Laumann and Knoke, 1987).

In reviewing the three main limitations of the Advocacy Coalition Framework, it becomes clear that the most fundamental criticism concerns the design of the *policy subsystem* (see right box in figure 1 of section 2.1), and, more specifically, the 'policy arena'. By depicting three key elements of the policy arena – namely, coalitions, belief systems and brokers – the Advocacy Coalition Framework does not do justice to the complexity of the interpersonal relationships within the actor network. The character of the relationships between actors, the mechanisms of mutual influence and the flow of resources between actors remain unclear when using the Advocacy Coalition Framework – despite the fact that several scientists have proven the crucial effect of relational features, such as the strength of the relationships, group closure and mutual trust (e.g. Granovetter, 1973; Portes, 1998; Coleman, 1988). This is exactly the field in which social capital theory has explanatory value. Social capital theory reveals the flow of resources between actors based on formal and informal interpersonal relationships within a certain network of actors. In social capital theory, the focus is not on coalitions but on interpersonal connections between actors who may participate in and withdraw from multiple coalitions. It is not the values and interaction of coalition partners that is central but the values and interactions of individuals. In other words, the social capital theory looks at group dynamics from a more micro level than the advocacy coalition theory and therefore may contribute to a further explanation of policy processes. The following section will outline social capital theory.

21 See, for example, Fenger, M. and P. Klok, (2001).

Proposition 1: Social capital theory can substantially enrich the Advocacy Coalition Framework in the sense that it reveals the effect of network characteristics and dynamics on the innovation process.

2.4 THE ORIGINS OF SOCIAL CAPITAL

Social capital has become an established concept in social research in the last two decades (e.g. Westlund, 2006; Castiglione et al., 2008; Lin et al., 2008). Although its early theoretical focus was on sociology, over time it has been applied to various other scholarly disciplines, such as politics and economics (Castiglione et al., 2008:1). In politics, the focus of study has been primarily on the effects of social capital on political participation and institutional performance (e.g. Putnam, 1993 and 2000). For example, in various political studies, social capital is seen as a way to predict or assess political performance. The economic research largely focuses on the effects of cooperation between economic agents and more generally the reduction of transaction costs (e.g. Becker, 1974; Bolton and Ockenfels, 2000; Fehr and Gächter, 2000). Seen in economic terms, social capital is an input of the production function; it has the capacity to (positively or negatively) influence the total productivity factor (Castiglione et al., 2008:7). In the social sciences, many studies have been carried out on the relation between social capital, social cohesiveness, community support and life satisfaction (e.g. Warren, 2001; Hooghe, 2008). In these studies, the notion of social capital is interpreted more normatively in the sense that social capital is perceived as a positive aspect of society that needs to be stimulated to enhance citizens' (social) quality of life.

The broad application of the notion has resulted in multiple definitions and interpretations of the concept. In fact, scholars still disagree on the precise meaning of the concept (Castiglione, 2008:13). The term itself, or equivalent alternatives, increasingly appeared from the 1950s onwards (Seely et al., 1956; Jacobs, 1961; Loury, 1977). Jane Jacobs, for instance, mentioned the term in her 1961 book *The Death and Life of Great American Cities* while referring to the value of a network of human relationships within cities or neighbourhoods, which provides mutual support, ensures safety and fosters a sense of civic responsibility. However, she did not explicitly explain or define social capital. One of the first comprehensive formulations of the notion of social capital was provided by Pierre Bourdieu (1983), who distinguishes between three forms of capital: economic, cultural and social capital. He defines social capital as (ibid, p. 248): 'The aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, to membership in a group – which provides each of its members with the backing of the collectivity-owned capital, a credential which entitles them to credit, in the various senses of the word.'

Bourdieu perceives social capital as the *whole of durable social connections* of an individual and the potential benefits that could be gained through those social connections (such as access to finance, knowledge and power). However, sev-

eral scholars confronted Bourdieu's definition with the work of Granovetter (e.g. 1973, 1974) who demonstrated that the strength (or durability) of ties is variable. Granovetter stated in his article 'The strength of Weak Ties' that 'most network models deal, implicitly, with strong ties, thus confining their applicability to small, well-defined groups' (Granovetter, 1973:1360). He defines the strength of an interpersonal tie as 'a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and the reciprocal services which characterise the tie. Each of these components of the strength of a tie is somewhat independent of the other, though the set is highly interrelated' (ibid, p. 1361). He argues that weak ties are more likely to link members of different small groups than strong ones, which tend to be concentrated within particular groups. 'Intuitively speaking […] whatever is to be diffused can reach a larger number of people, and traverse greater social distance, when passed through weak ties rather than strong ties' (ibid, p. 1366).

Coleman's work is also frequently cited in that respect. He focuses on the *social structure of relationships* (Portes 1998:2-3) and defines social capital as (Coleman 1988:98 and 1990:302): 'A variety of entities with two elements in common: they all consist of some aspect of social structure, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure.' In his first essay on social capital, Coleman examined the role of social capital in the creation of human capital. He studied the possible use of social capital for the acquisition of educational credentials. However, Portes (1998:5-6), who compared several definitions and applications of social capital by leading scholars, stated that Coleman's definition of social capital fails to clearly distinguish between '(a) the possessor of social capital, (b) the sources of social capital and (c) the resources', and his definition may therefore lead to confusion regarding the term's use and scope. More generally, Portes (ibid, p. 2-3 and 22) concludes that the use of social capital as an umbrella concept encompassing variables that are linked to social capital – such as shared values and institutional contexts – may impede a clear-cut operational analysis of the mechanisms of social capital and consequently lead to confusion regarding its ends and means and/or cause and effect.

A broad interpretation of the term social capital can also be found in the influential work of Robert Putnam (e.g. 1993 and 2000). In his publications, he refers to social capital not only as an individual's set of social connections, but also as specific norms and values – such as trustworthiness, reciprocity, fellowship, sympathy and good will – that can determine relationships between people and the merits for a community as a whole that should derive from social connections (e.g. Putnam, 2000:19-21). Putnam stretches the term social capital by capturing the *norms and values* and the *consequences* of personal relationships in the term social capital and by considering social capital as both an individual and a social asset. Moreover, he does not have a technical and neutral, but normative understanding of social capital; the presence of social capital in a society – according to his interpretation – will benefit it as a whole in the sense that it is more efficient than a distrustful society (ibid, p. 21). In his own words: 'If we don't have to balance

every exchange instantly, we can get a lot more accomplished. Trustworthiness lubricates social life.'

However, one could also argue that *generalised reciprocity* is a collectively shared value or belief in helping each other out that prevails in a certain society or not, and that may evoke a general feeling of trust, the presence or absence of which will obviously affect the well-being of the citizens and the society as a whole. But this value can exist independently from social capital interpreted as social connections.[22] Ties between people can develop out of shared altruistic values, such as solidarity, as well as more selfish motivations, or it can be compelled by necessity. In other words, the absence of a general feeling of reciprocity does not automatically imply that people are not connected. Theoretically, it may well be the case that while generalised reciprocity is low in a given society, connectedness is simultaneously high, because people's self-interest forces them to enter into certain relationships.

Substantial contributions to an improved understanding of the notion of social capital have been provided by Lin (e.g. 2001, 2008). Lin defines social capital as (2001:25): 'Resources embedded in one's social networks, resources that can be accessed or mobilized through ties in the networks.' Through these kinds of social connections or through social networks in general, an individual may borrow or acquire another individual's resources, such as their skills, knowledge or financial capital (Lin, 2008:51). Subsequently, these cultural, social and/or financial resources can generate a return for the actor. In other words, social networks are infrastructures with nodes and links, and resources can flow through these links (see also Westlund, 2006:6). Elaborating on this, the resources present in the network and the flow of resources depend on the features of the nodes, links and the network, the characteristics of which are interrelated. An individual can possess certain resources, (such as knowledge) and have a certain position and reputation (e.g. Westlund, 2006; Castiglione et al., 2008). A relationship can be strong or weak, it can be based on profession or kinship and it can have a certain level of trust, shared norms and beliefs. And a network can be characterised by density, coalitions, broker's positions or value systems. Lin's definition (2008:51) will be used for the present research as his formulation provides the most clear-cut and neutral understanding of the notion of social capital, thereby facilitating a straightforward operationalisation of the concept.

2.5 THE INFLUENCE OF SOCIAL CAPITAL ON INNOVATION PROCESSES

In recent decades, many scientists have linked social capital theory to the occurrence of innovations (Porter, 1990; Fountain, 1997; Rutten, 2007; Partanen, 2008; Hulsink et al., 2008; Considine et al., 2009). Most scholarly contributions can

22 The term bounded solidarity is also used to refer to generalized reciprocity within a certain society. See, for example, Portes (1998:8) and Coleman (1990:273-82).

be found in private sector literature. In the 1980s, several scholars stressed the emergence of *spatial clusters* and *regional innovation systems*, pointing out that functioning innovation networks are significant for national successes in a world of increased globalisation and competition (e.g. Lundvall 1992; Freeman, 1987; Porter, 1990). Castells (1996:419-21) also emphasised the importance of communication networks in shaping new 'milieux of innovation'. Rutten et al. (2007) argue that since innovation is increasingly a network effort, embeddedness and social capital help to explain how and why regional networks of innovating companies are successful. According to Rutten et al. (2007:1838), it makes sense to speak about *regional* innovation systems, 'since 'geographies of knowledge' show that it is more effective to exchange tacit forms of knowledge in face-to-face relations and that spatial proximity is helpful for face-to-face relations.' However, Florida (2002:273) contends that social capital theory provides little explanation for regional innovation growth. He argues that 'both the human capital and the creative capital theories are much better at accounting for such growth.' Yet, Florida (ibid, p. 277) recognises that weak ties are 'critical to the creative environment of a city or region because they facilitate the rapid entry of new people and rapid absorption of new ideas.'

One particular sector which received much scholarly attention is the *biotechnology industry* (e.g. Powell, 1996; Fountain 1997; Traore et al., 2003; Gay et al., 2005; Nooteboom, 2006; Casper, 2007; Stuart et al., 2007). Powell et al. (1996) were among the first to apply a social network approach to analyse the emergence of collaboration and competition in the biotechnology sector. The central premise emerging from the empirical findings of Powell et al. is that in many of the biotechnology industries, today's networks of inter-firm collaboration are characterised by cycles of mutual learning. Hulsink et al. (2008:18) argue that: 'Collaboration allows the firms to carry out research and development and create new alternatives, while simultaneously mitigating the costs, risks and problems associated with such an exploration route.' By exchanging, sharing and assimilating expertise and experience, these biotechnology firms continuously enhance their absorptive capacity (ibid, p.16). Fountain (1997) demonstrated the effect of social capital on innovation by describing two case studies: the US biotechnology sector and Silicon Valley. According to Fountain, social capital – in the form of linkages between people of different organisations – enhances innovation in the sense that these networked organisations have a more efficient use of human and technical resources than organisations with a low level of social capital (Fountain 1997).

Another area which received specific attention is the *small and medium business sector* (Davenpoort, 2005; Partanen, 2008; Hulsink et al., 2008, Zeng et al., 2010). Several scholars have recognised an efficient and effective use of social networks as a key driver in the production and implementation of innovations by small and medium enterprises (SMEs). Hulsink et al. (2008) argue that particularly in SMEs, innovation processes transcend the boundaries of a firm. They state that (ibid, p.3): 'External parties may be sources of inspiration and/or they may contribute to the implementation of innovations. Many SMEs have insufficient organisational resources, knowledge or capabilities to develop innovations by themselves.' These

are – according to Hulsing et al. – all reasons why smaller firms may seek collaboration with larger parties. Several scholars (e.g. Westlund et al., 2008) point to the role of universities in stimulating innovation and their cooperation with regional businesses (such as SMEs) and government. In addition, theories such as the 'Triple Helix' emerged, which emphasises knowledge transfer within society (e.g. Etzkowitz and Leydesdorff, 2000). The triple helix concept is a spiral model of innovation, based on social processes, proximity and learning rather than purely technical and economic factors (Doloreux and Parto, 2004). The overall premise of the theory is that universities need to become flexible institutions that can meet changing demands by active participation in collaborative networks.

More recently, social capital theory and social network analyses have been increasingly applied to public sector innovation (Martin, 2000; Borins, 2001; Walker et al., 2004; Huijboom, 2005; Walker, 2007; Considine et al., 2009). In his study of innovation strategies in Australian local government, Martin (2000:9), for instance, describes how networks facilitate the building of trust and free flow of information between actors of separate organisations. Martin (ibid, p.9) contends that networks 'play a role in mitigating environmental uncertainty and promoting social learning of adaptive responses among linked organisations.' Walker (2007:6) demonstrates how government practitioners have access to proven ideas and strategies through their professional networks, which use of their network stimulates the development and diffusion of innovation. Borins (2001:317) contends that innovation diffusion is greatly stimulated by inter- and intra-organisational learning through conference attendance, workshops and other knowledge-sharing platforms. The book of Considine et al. (2009) provides a comprehensive insight into networks, innovation and public policy. They argue that networks are crucial to innovation and more important than other variables that could be expected to impact innovation substantially. According to Considine et al., networks provide a viable and robust way of describing and understanding the links between structural and individual elements of the innovation.

In reviewing all the studies, it appears that most studies agree on two aspects, namely (1) that there is a relation between the presence of social capital and the innovativeness of (networks of) organisations and (2) that – unfortunately – research show highly contradictory results regarding the precise impact of social capital. The contradictory results are often attributed to the macro level on which social capital is studied or the lack of operationalisation of the notion. Kasaa (2007:27), for instance, argues that different research results can be explained by the lack of distinction between various dimensions of social capital (e.g. trust, norms and ties). Franke (2005:5-6) argues that social capital theory risks losing its explanatory power when there is not a proper distinction between the various dimensions. Nooteboom (2007:29) concludes that the concepts of and the relations between social capital, institutions and trust are riddled with ambiguity and confusion. Dolfsma et al. (2009) argue that the concept of social capital remains a black box since the *mechanisms* that constitute it remain underdeveloped. Consequently, to increase the understanding of social capital impact on innovation processes, the following sections categorize and elaborate on the five dominant

network and tie characteristics (closure versus openness, strong versus weak ties, heterogeneity versus homogeneity, broker's position and low- versus high-trust relationships) and subsequent mechanisms described in literature.

2.5.1 Network closure

In his study, Bourdieu (1983) emphasises on the social capital of elite groups and the *closure of groups*.[23] He argues that networks are the product of an endless effort of order to produce and reproduce lasting, useful relationships that can secure material or symbolic profits (Bourdieu, 1983:249-50):

> The network of relationships is the product of investment strategies of the individual or collective, consciously or unconsciously aimed at establishing or reproducing social relationships that are at once necessary and elective, implying durable obligations subjectively felt (feelings of gratitude, respect, friendship, etc.) or institutionally guaranteed (rights). Through the introduction of new members into a family, a clan, or a club, the whole definition of the group, i.e. its fines, its boundaries and its identity, is put at stake, exposed to redefinition alteration, adulteration.

Bourdieu argues that networks are selective in adopting new members into the group, that networks try to bring together individuals that are as homogeneous as possible in all the pertinent respects in terms of the existence and persistence of the group.

Several scholars argue that mechanisms of group closure affect the innovative capacity of a group. In private sector innovation literature this has been frequently referred to as a *lock-in effect* (e.g. Uzzi, 1997; Kaiser, 2003; Hulsing, 2008; and Van der Vliest, 2009). Hulsink (2008:5-6), for instance, argues that network closure can be seen as a less positive side of the networks as organisations can cause a lock-in in the sense that they have limited access to new ideas and strategies. Uzzi (1997) referred to the disadvantages of the over-embeddedness of relationships, namely that firms may have limited access to new knowledge and hence find it harder to adapt to new circumstances. Van der Vliest et al. (2009:217), who studied innovation management in the construction industry, came to the conclusion that group closure may hamper the diffusion of innovations. For instance, a manager who is strongly tied to a cohesive group of peers may be less able to adapt his or her communication network to change and thus influence innovation diffusion.

Also in public sector literature, several scholars refer to mechanisms of group closure (Teske et al., 1994; Newman et al., 2001; Considine et al., 2009). Teske et al. (1994) investigated bureaucratic entrepreneurship within the United States local government and Newman et al. (2001) examined innovation in local governments in the United Kingdom. Both studies suggest that networks may have a constrain-

23 Group closure can be as much of a network mechanism as group openness. Density or weakness of ties and networks are characteristics of a tie or network. However as the group closure mechanism is more frequently mentioned to have an impact on innovation, it will be the focus of this section.

ing influence by encouraging conformity to dominant perceptions of appropriate behaviour, and thus patterns of connectedness can explain roadblocks impeding change (see also Considine, 2009:56). Overall, scholars argue that in the case of group closure the interaction between members of the group and members of other groups is limited, which also restricts the exchange of new ideas, paradigms and knowledge. The mechanisms of confirmation, reproduction and consolidation of existing values, norms and ideas within a group imply a limited stimulus for alteration and thus a low degree of innovativeness.

However, several academics argue that group closure may not only hamper, but also stimulate innovation. Van der Vliest et al. (2009:217), for instance, argue that network closure may enable the diffusion of innovation. Rogers (1995:241) identified the compatibility of an innovation with the norms and values of an actor as an important factor enabling the adoption of the innovation. When an innovation is highly compatible with the strong values and beliefs of a closed community, it is likely to diffuse quickly within the community. In addition, once the *pater familias*, or the opinion leader, of a closed group has adopted an innovation, the speed of the diffusion within the group can be high because of the reproduction mechanisms within the group.

That norms and belief systems play an important role in government innovation is confirmed by Considine et al. (2009)) and Martin (2000). Martin (2000:9), for instance, states that local governments 'pay more attention to the way neighbouring, and similar local governments address new issues than to benchmarking and reviewing their own process in isolation' (see also Considine 2009:54). By observing comparable agencies, government practitioners create a frame of references through which they assess the relevance, appropriateness and actions needed for certain innovations. Newman (2001:65-67) et al. refer to this mechanism as they describe how informal values, beliefs systems or prevailing 'logics of appropriateness' institutionalised, which in turn shaped the behaviour of members and practitioners of local governments. Yet, the effects of these institutionalised norms on innovation were not uniform (see also Considine, 2009:55).

More clarity about the mechanism of group closure – or it opposite group openness – and its impact on the innovation process can be gained by using the logic of Lin's argumentation (1986, 1990, 1992). According to Lin, the question of whether a network's openness or closure can generate access to resources or help accomplish a certain goal (e.g. innovation) depends on prevailing interests (Lin, 2001:27). Lin argues that (ibid, p.27):

> For preserving or maintaining resources (i.e. expressive actions), denser networks may have a relative advantage. Thus, for the privileged class, it would be better to have a closed network so that resources can be preserved and reproduced (e.g. Bourdieu 1983/1986) or better for a mother to move to a cohesive community so that her children's security and safety can be assured (Coleman 1990). On the other hand, for searching and obtaining resources not presently in people's possession (i.e., instrumental actions), such as looking

for a job or a better job (e.g. Lin, Marsden, Flap, Burt), accessing and extending bridges in the network should be more useful.

Building on Lin's argumentation, group closure and group openness can both stimulate and hamper the innovation process, depending on the specific innovation goal at a given moment in time.

Proposition 2: Group closure encourages the reproduction of ideas and hence provides limited access to new ideas and strategies and limits the creation of innovations.

Proposition 3: Group closure stimulates the diffusion of innovations that are highly compatible with the norms and values of the closed group.

2.5.2 Strength of the ties

The question of whether *weak or strong* ties enhance innovation is also quite controversial and often related to the discussion about open and closed networks (e.g. Kaasa, 2007; Hulsink et al., 2008; Considine, 2009). The difference between the two, however, is that whereas the strength or weakness of a tie refers to the intensity of a relationship between two people, the closure or openness of a group says something about the *culture* inside a group. Closure or openness is embedded in the attitude of its group's members, which, in turn, is based on the group's values and norms. Hofstede (1991:188-91) identified six dimensions of culture, one of which is open versus closed systems. In the open system, members consider both the group and its people open to newcomers and outsiders; almost anyone would fit into the group, and new members soon feel comfortable within the group. In the closed system, people seem closed and reserved; only specific people fit into the group, and more than a year is needed for new members to become fully fledged members. Depending on the extent to which the culture of a group is open or closed, members are more or less open to deviant ideas and newcomers and have a certain degree of tolerance towards people's otherness.

The strength of ties, on the other hand, says something about the intensity of the relationship between two people, which is a combination of the amount of time they spend together, the mutual emotional involvement, the intimacy (mutual confiding) and the degree of reciprocity which characterises the tie (Granovetter, 1973:1361). The strength of ties is also referred to as relational embeddedness (Hulsink et al., 2008:15). Existing literature distinguishes between relational and structural embeddedness; relational embeddedness refers to the characteristics of relationships, while structural embededness refers to the structure of the network. Whereas relational embeddedness says something about the strength of ties, structural embeddedness may, for instance, refer to centrality or a position rich in 'structural holes' (see also section 2.5.4).

Most scholars agree that the strength of ties may affect innovation processes (e.g. Granovetter, 1973; Ruef, 2002; Kaasa, 2007; Hulsink et al., 2008; Considine, 2009; Van der Vliest, 2009). As illustrated before, Granovetter (1973) argues that weak

ties extend to a larger number of individuals, and thus innovations can be diffused among a larger number of people when passed through weak rather than strong ties. In addition, several scholars argue that weak ties support, enable and accelerate information exchange and decrease the cost of information search (e.g. Kaasa, 2007). Kasaa (2007:9) argues that weak ties seem particularly beneficial when it comes to gaining access to know-how with the help of 'know who', i.e. information about who knows what (e.g. Gregersen and Johnson, 2001; Lundvall, 2006). Furthermore, a network of weak ties increases the opportunities for radical breakthroughs as it is more likely for unusual combinations of creative ideas and thoughts to emerge in these networks (Subramaniam and Youndt, 2005).

Most of the scholars who emphasise the strength of weak ties in innovation processes describe a specific innovation stage, namely the stage of idea creation or the spreading of information in the diffusion phase. However, in other innovation phases, strong ties may stimulate the innovation process. Burt (1987 and 1999), for instance, argues that the formation of a normative understanding of the advantages and disadvantages of an innovation and the decision to purchase and/or start using an innovation of a person are (among others) based on the opinion of his peers and friends. Peers, because of imitation behaviour (see also Rogers, 1995) and cohesion, because of mutual recognition. Consequently, people may more easily adopt new ideas, products or ways of working when adopted by someone they identify with (e.g. peers and friends) and with whom they often have closer ties, as opposed to people they do not identify with. Thus, whereas weak ties may stimulate the spreading of information, strong ties may support the actual adoption of the innovation by individuals.

The difference in relevance between strong and weak ties may also depend on the degree of uncertainty in the innovation process. Burt (1987), who emphasises the influence of peers and friends, studied the adoption of a new drug by general practitioners, the precise effects of which were still highly uncertain. As it turns out, people are likely to be more autonomous in their decision to adopt it or not if it entails a more mature innovation, the impact of which has been underpinned by considerable evidence. Similarly, Hulsink et al. (2008:14) argue that strong ties are more likely to be useful in situations characterised by high levels of uncertainty and insecurity, for instance radical innovations. In these complex settings, individuals rely on close relationships in order to reduce uncertainty. Krackhardt (1992) has elaborated on strong ties by arguing that commitment, loyalty and friendship within an organisation will be critical to that organisation's ability to deal with disruptive changes, such as a crisis.

In conclusion, both weak and strong ties can stimulate innovation, depending on the innovation stage and the level of uncertainty. In stages where bridges have to be built between separate organisations – for instance in the initiation or the development phase – and uncertainty about the innovation outcome is high, strong ties may positively influence the innovation process. However, in stages of information dissemination – for instance when the innovation has to be dif-

fused – and uncertainty is low, weak ties may have a stimulating effect on the innovation process.

Proposition 4: Weak ties extend to a larger number of individuals, and thus information on innovations can be spread among a larger number of people when passed through weak rather than strong ties.

Proposition 5: Strong ties may stimulate the creation and adoption of highly uncertain innovations.

2.5.3 Heterogeneity of the network

Many contemporary scholars refer to Schumpeter's work *The theory of economic development: an inquiry into profits, capital, credit, interests, and the business cycle* (1934:65-6) in which Schumpeter argues that innovation results from the recombination of knowledge held by the partners with whom they collaborate (e.g. Westlund 2006; Considine et al., 2009). Several scholars argue that a certain degree of heterogeneity among participants in an innovation is a prerequisite for the development of new ideas, approaches or products. In their research on innovations in SMEs, Hulsink et al. (2008:16) found that 'firms with a more heterogeneous mix of partner alliances enjoyed faster revenue growth and tended to obtain more patents' than firms with a more homogenous mix of partners (and were thus considered more innovative). Edelenbos et al., (2009:5) also stress the importance of a wide variety of contacts. In their publication on collaboration in governance networks, they argue that managers with more varied contact with actors in the network stand a better chance of achieving a positive outcome.

Gelauff (2003) and Cohen and Fields (2000) argue that the pervasive presence of heterogeneous ties in Silicon Valley is one of the crucial explanatory factors that explain Silicon Valley's great innovative power. Frequent job changes and varying alliances enable a fast exchange of information and hence an ongoing rejuvenation of ideas and constant acquisition of knowledge. Multi-disciplinary, intersectoral, but also internal exchanges between the operational and top level of organisations stimulate the gaining of new insights. For cross-agency innovation this would imply that the most innovative joint projects would be undertaken by the most heterogeneous forms of cooperation. Considine et al. (2009:191) found in their study on innovation in four municipalities that the interpersonal networks for seeking advice and strategic information varied across governments by the amount of homogeneity displayed. Actors in some municipal governments had a higher diversity of ties while actors in other governments were mostly connected to people like themselves. Considine et al., however, are not conclusive about the effects these differences have on the innovative performance of municipalities.

Proposition 6: Heterogeneity of the subsystem enhances the innovative capacity of the subsystem.

2.5.4 Broker's position in the network

Burt (1992, 1999) underlines the competitive advantages with regard to information diffusion that individuals can obtain by having or taking a strategic position in a certain social structure. Individuals can act as bridges between diverse social groups by having strong ties with people from diverse groups – they can bridge structural holes and therefore have access to information that is more additive than overlapping (Burt, 1992:25-30). They carry information across the social boundaries between groups and thus play a role in brokering information between groups. These so-called *opinion brokers* – are brokers twice over (Burt, 1999). As Burt explains (ibid, p.11):

> Firstly, opinion leaders are brokers in the sense that their influence is between, rather than within, groups. Within groups, contagion is by equivalence, not cohesion. Cohesion matters across groups. […] Second, opinion leaders are brokers in the sense that they are a transition between the two network mechanisms responsible for contagion. The two-step flow of communication is a compound of two very different network mechanisms; contagion by cohesion through opinion leaders gets information into a group, then contagion by equivalence triggers adoption within the group.

Thus opinion brokers are not leaders within the groups as much as brokers between groups.

In the past decade, several scholars have discussed the brokerage, not only of information, but also other resources, such as human capital. Hulsink et al. (2008:15-6), for instance, mention both knowledge brokerage and human-resource brokerage. They state that centrality in a network can bridge specialised knowledge within different groups. In addition, they argue that structural holes allow entrepreneurs to bring together people who are not yet connected. Another point they make is the relative advantage the broker has, as he or she is – more than others – able to control and influence information flows and the connecting of people. Hulsink et al. also relate the structural hole theory to innovation processes, arguing that: 'Since new information and the ability to find new knowledge appears to be crucial to innovation, the structural hole argument has great potential.' Van der Vliest et al. (2009:213) point to the brokerage of 'potential adopters' , arguing that those who are able to bridge the gaps between networks are able to get their ideas adopted more easily and consequently are better able to spread their innovations more rapidly.

Considine et al. (2009) examined the relation between the position of individuals in the network and the extent to which they are perceived to be innovators. They construct their premises on the theory that new connections are made based on popularity, which is a function of longevity. Considine et al. argue that (ibid, p.53) 'Popularity attracts new ties, so those actors with many connections make more new connections than those with fewer links' – a phenomenon referred to a preferential attachment by Barabasi (2002). The question Considine et al. pose is whether innovators are popular in networks with many ties or have a limited

number of connections that are more strategic. Their empirical evidence shows that normalised in-degree centrality for the strategic information network is a significant predictor of recognition as an innovator in two of the four cases they studied (2009:196). In other words, if you are an innovator then you are probably also someone many people approach for strategic information. In addition, Considine et al. (2009:185) conclude that innovators are not all concentrated in the most senior positions in all governments, but are spread across a vaster hierarchy. Thus, the hierarchic position seems to matter less than the strategic position within the network.

Edelenbos et al. (2009), who analysed the network management strategies of 'network managers', stress that network managers operate in a *divided power structure*. They state that (ibid, p.3): 'From a network perspective, the power of an actor depends on the range of resources available to him and the extent to which he is dependent on the resources of other actors (Scharpf, 1978).' The more involved and mutually dependent on each other's resources actors are, the more equal the power division in the network. Elaborating on this, one could argue that – in a situation in which people are equally dependent on each other's resources – the power of a person with a central position in the network (e.g. through bridging structural holes) is greater than of a person with a less central position in the network, since the central person has access to more additive resources. However, Edelenbos et al. note that (ibid, p.3) – even in situations of unequal power division (e.g. unequal dependency and/or centrality of certain actors), powerful actors have limited authority as they do not have 'direct authority regarding the way other actors use their resources.'

In conclusion, bridging positions may impact the innovation process in the case of joint innovations. Opinion brokers can stimulate the exchange of knowledge, the involvement of people, the creation of consensus and the harmonisation of opinions. However, opinion brokers may also use their strategic position to obstruct an innovation, e.g. mobilise opponents, prevent knowledge exchange and use strategic information to hinder the innovation process.

Proposition 7: Brokers have a significant influence on the direction innovation takes and can hamper or stimulate the innovation process.

2.5.5 Interpersonal trust

Even today, scientists greatly disagree on the question whether trust is a requirement of social capital or a variable. Whereas Ahn and Ostrom, (2008:73) for instance identify trustworthiness as one of the three basic forms of social capital (the other two being networks and institutions), Lin uses a more technical and less normative definition of social capital in which trust – or mutual recognition – is a feature of a relationship between two persons (2001:131 and 147-9). In Lin's view, social capital can be understood as resources embedded in a social structure that can be accessed and/or mobilised in purposive actions (Lin, 2001:29). Various levels of trust can exist in the social structure, and thus trust can be perceived as a

variable. Although scholars disagree about the relation between the concepts of social capital and trust, they do agree about the importance of trust in situations of cross-organisational cooperation (e.g. Sabel, 1993; Lane and Bachmann, 1998; Castells, 1996; Wehmeyer et al., 2001, Klijn; 2002, Nooteboom, 2006; Edelenbos and Klijn, 2007). They also point to the fact that there are many different conceptions of trust, and there is a generally accepted conceptual understanding. Hence, in the following sections an overview will be provided of important theoretical contributions on the definition and mechanisms of trust in collaborative environments.

There are many interpretations of the notion trust (e.g. Edelenbos and Klijn, 2007:29). Some perceive trust as an expectation (see Lane and Bachmann, 1998; Rousseau et al., 1998); others consider trust to be the cement of society (Fukuyama, 1995) or a container concept that is closely related to shared norms and rules (see, for instance, Putnam 1995). However, to be able to conduct empirical research, a clear-cut definition of the concept is needed. Edelenbos and Klijn, who compared several definitions of trust in scholarly contributions, identified three key characteristics of trust, namely vulnerability, risk and expectations (2007:29):

- The first dominant characteristic of trust is vulnerability. When an actor trusts another actor, he or she is willing to assume an open and vulnerable position. He or she expects the other to refrain from opportunistic behaviour even if there is the possibility that the other will show this behaviour (Deakin & Michie, 1997; Deakin & Wilkinson, 1998). […]
- The second dominant characteristic is risk (Chiles & McMackin, 1996). Trust plays an important role in ambiguous, unpredictable and risky situations. In risky situations, trust is a precondition for undertaking any action (Gambetta, 1988a, 1988b; Lane & Bachmann, 1998). […]
- The third dominant characteristic is expectations. The concept of trust presumes a stable positive expectation (or prediction) of the intentions and motives of other actors (Lane & Bachmann, 1998). Trust reduces unpredictability, complexity, and ambiguity in interactions because one can anticipate (some of) the behaviour of the other actor (Zucker, 1986).

Although most concepts of interpersonal trust share these three common elements, theorists have conflicting views on the social grounds on which trust may be based (Lane, 1998:4). These theoretical differences are predominantly caused by a different approach to human nature (e.g. the extent to which mankind is seen as being rational). Some theorists (mainly economists) perceive trust as a rational assessment by an individual of the chance that the other will act in an opportunistic way (e.g. Williamson, 1993, Preisendörfer, 1995). In this perspective, human action (and also trust in certain behaviour of the other) is based on a rational calculation of the costs and benefits and chance of opportunistic behaviour. According to these theorists, a person is only willing to trust the other in situations in which he or she expects that – based on a cost-benefit calculation – the other will not act in an opportunistic way. This instrumental approach of trust, however, has received considerable criticism. Most critics contend that rational actor theories neglect the unpredictability of future behaviour and incompleteness of information, which hamper a clear-cut assessment of costs and benefits (Lane,

1998:5). Whereas Axelrod (1984) and Coleman (1990), for instance, assume that actors share expectations about the future, more sociological accounts would stress that the unfolding of the future is in itself uncertain. As trust is built incrementally, and the relationship may change in an unpredictable direction, neither gains nor losses can ever be calculated with certainty. In other words, in every relationship there are uncertainties which require a basis of trust for certain human interaction and action. As Bradach and Eccles put it (1989:108): 'The future is rarely preordained; magnitude and timing of the trustee's response is influenced by social norms which complicate calculation: and, most importantly, the first step in "a game without history", taken in the face of incomplete information about the trustee, requires a one-sided precommitment from the trust or based on mere beliefs/expectations about the trustee.'

However, there is a third theoretical stream of scientists who contend that the grounds for trust will vary with the social context of trust and/or that the nature of trust will vary with the stage a relationship has reached (Lane, 1998:4). These theorists use a multidimensional concept of trust based on a combination of theoretical viewpoints. Common combinations are cognitive trust with value, or emotion-based trust (e.g. Barber 1983; Lewis and Weiner, 1985), and a combination of calculative with either cognitive or morally based trust (Dasgupta, 1988, Chiles and McMackin, 1996). In both these theoretical approaches of trust, common cognitions are considered to have a determining influence on the presence or absence of trust. Cognitions, defined as 'the rules that constitute the nature of reality and the frames through which meaning is made' (Scott, 1995:40), are embodied in the expectations people have of the social order in general and of specific interaction with others. Cognitions form a basis for interpersonal trust or distrust in the sense that individuals base their expectations of others' behaviour towards shared social norms. Zucker (1986), for instance, argues that expectations are based on social rules that provide a general framework for behaviour. In addition, Zucker contends that the stronger the common social framework of rules and routines (e.g. due to social homogeneity), the more likely it is that trust will develop spontaneously.

Most theorists argue that levels of interpersonal trust and trustworthiness are not static but dynamic; e.g. trust and trustworthiness can appear and disappear (Zucker, 1986; Lindenberg, 2000; Nooteboom, 2002). The literature on the subject pays particular attention to the construction of trust (Nooteboom, 2002:89). Shapiro (1987:625) argues that: 'Typically (…) social exchange relations evolve in a slow process, starting with minor transactions in which little trust is required because little risk is involved and in which partners can prove their trustworthiness, enabling them to expand their relation and engage in major transactions.' Other scholars have endorsed this line of reasoning (e.g. Smith Ring and Van de Ven, 1992). McAllister (1995) for instance identified two phases of trust development; in the first phase trust is cognition-based and in second stage affect-based. Lewicki and Bunker (1996) elaborated on this while distinguishing between three stages; calculus-based, knowledge-based and identification-based trust. Nooteboom (2002:90) proposes the following three stages of the evolution of trust:

1. Stage of control in the absence of trust. In this stage, trust is absent, which forces individuals to assess the competences and opportunism of the other. One way in which people try to limit the risks is by taking small steps.
2. Stage of assessing trustworthiness and creating tolerance levels of trust. In this stage, the involved persons mutually obtain more knowledge and experience, which forms the basis for setting tolerance levels of trust.
3. Stage of widening tolerance levels, on the basis of identification. In this stage, the tolerance levels of trust are widened as a result of identification and empathy.

Interpersonal trust can not only increase over time but also decrease (Nooteboom 2002:92). A decline of trust between two individuals can occur if one of the involved parties does not live up to the expectations of the other. However, Zucker (1986:59) argues that those disappointments in the other do not necessarily terminate the trust. According to him, 'A violation of expectations produces a sense of disruption of trust, or profound confusion, but not of distrust. Distrust only emerges when the suspicion arises that the disruption of expectations in one exchange is likely to generalize to other transactions. To distrust, then, implies an attribution of intentionality that continuous throughout all interactions or exchanges, at least of a particular type.' Nooteboom (2002:93) argues that a joint solution of a conflict can strengthen trust in several ways. On the one hand, it may result in a learning process, which confirms the value of the relation and thereby increases mutual commitment. Moreover, the fact that the relation survived the conflict may increase interpersonal trust. On the other hand, a violation of expectations can result in mutual recrimination and suspicion, particularly between people who have a weak tie.

Although the research area of trust and networked innovation is relatively recent, several theorists have argued that the presence or absence of trust can have a determining influence on the occurrence of networked innovation (e.g. Lane and Bachmann, 1998; Van de Ven 1999; Fountain, 2000; Nooteboom, 2006; Kaasa, 2008). In the conception phase of a network innovation, the sharing of (multidisciplinary, inter-sectoral and/or inter-level) expertise is an important driver for the creation of new ideas. If personal or company interests – such as intellectual property – are not contractually arranged, the risks high and the balance of power unequal, then a high level of trust is needed to share expertise within the network. Trust may also be a prerequisite in the implementation phase of joint innovations. Often the interests of involved parties are divergent or even conflicting, rendering the risks for involved parties (poor return on investments or reputation damage) high. Trust is then a precondition for the ability to bridge deviating interests and foster willingness to take joint risks. In the diffusion phase, trust may be less important as a determinant as the risks may be lower because the impact and the outcome of the innovation may be less uncertain.

Nooteboom (2006:2-4) argues that trust is relevant in relation to the following three basic problems underlying collaborative innovation:

1. Because of its explorative nature and strong interdependencies, collaborative innovation can imply substantial risks and uncertainties for involved actors (both individuals and organisations). As various partners are involved in the innovation, there can be a lack of mutual understanding, or 'absorptive capacity'. This might be particularly the case in process innovation, where knowledge and competencies are being developed. Business models are new and a common language still has to be developed. On the one hand, cognitive distance and heterogeneity is needed in order to innovate (to combine knowledge) and, on the other hand, cognitive distance can hamper effective collaboration. Nooteboom (2006:3) speaks in this regard of 'the optimal cognitive distance'; large enough to yield novelty, yet time small enough to develop a mutual understanding.

2. A second problem of collaborative innovation identified by Nooteboom (ibid, p.3) is the risk of 'spillover'. He argues that 'competitive advantage from commercially valuable new knowledge or competence may 'leak' to competitors.' Although this problem seems not to exist in the public sector, there may be other forms of competition between public sector agencies. In cases of conflicting interests public sector agencies may use knowledge in a strategic way, e.g. to strengthen their position in relation to other public sector agencies.

3. Dependence on partners is mentioned by Nooteboom (ibid, p.3) as the third risk in networked innovation. When separate organisations jointly innovate, they depend on the efforts and investments of the other during the innovation process, but may also be dependent on them when the innovation is implemented (e.g. if they jointly use the new product or share processes). The dependence on partners limits organisations' ability to develop their own strategies, take their own decisions and act in their own interest.

Nooteboom argues that trust may be needed to cooperatively innovate in a network of organisations. He states (2006:4) that in order 'to deal with risks we can try to impose control, but control is never perfect, especially in innovation. In innovation there is too much uncertainty to manage risks completely by contract, monitoring and control. Innovation requires creativity, which requires freedom of action. And where control ends we need trust.'[24] In conclusion, depending on the number and significance of risks, presence of interdependencies, control mechanisms and/or contractual arrangements, trust may serve as an enabler of joint innovation.

Proposition 8: Trust supports high-risk innovation processes and can be partly compensated by interdependencies, control mechanisms and/or contractual arrangements.

24 However, Nooteboom also contends that trust should not be unconditional, since a solid ground for trust may be lacking (e.g. due to intense competition).

2.6 PHASE SPECIFICITY OF SOCIAL CAPITAL

The former sub-sections show that most of the social capital variables – e.g. openness of the network, strength of the tie, heterogeneity of the network, level of trust – may have a different effect in each of the innovation stages. This diversification has also been recognised by Nesta et al. (2004), who conducted social capital research in the pharmaceutical industry and found that the contribution of different types of partners and agreements to knowledge creation is linked to *the stage of innovation development*, and that therefore, innovation networks should be *phase-specific*. The different stages of innovation should call for a 'differentiated set of actors with a specific division of innovative labour' (Nesta et al., 2004:3). One of the key stages where these different types of external relationships may influence organisational performance is product development. Product development activities rely on the acquisition and synthesis of new knowledge (Cohen and Leventhal, 1990). External ties may be a vital source of diverse information that can spur this type of activity within firms. However, in the implementation stage external ties may be less important. Gabby and Leenders (1999) also argue that social capital that is beneficial in some phases of a process may not be helpful in later phases.

Hence, for the present research on the manifestation of social capital it is important to distinguish between various innovation phases. Schroeder, Van de Ven, Scudder, and Polley (1986, 1989) examined the processes of diverse technical and administrative innovations and made a distinction between three phases: the initiation period, the developmental period and the implementation period (e.g. Van de Ven et al., 1999:23). In the *initiation period*, people are engaged in a variety of activities that set the stage for innovation (Angle and Van de Ven, 1989). Knowledge is being built, acquired and exchanged, agendas are being influenced and coalitions formed. This stage of innovation can be characterised by a relatively high level of uncertainty; the necessary resources, the parties involved, and the characteristics, outcome and impact of the innovation are rather unclear. In the second stage of the innovation, the *developmental period*, parties start to actually develop the innovation. More concrete feasibility studies are carried out, crucial decisions (for instance on investments and the specifications of the innovation) are made and experts start to develop and test prototypes of the innovation. In the *implementation period*, the innovation is put in place in the sense that it is integrated into existing processes and procedures of participating organisations. The implementation of the innovation may require the alteration of existing legislation, structures, processes and products.

Van de Ven et al. (1999) do not define diffusion as a distinct stage in the innovation process, despite the fact that the diffusion stage contains a number of specific characteristics and therefore can be perceived as a separate phase (e.g. Rogers, 1995:168-71). In the diffusion phase, the innovation is fully mature and it starts being adopted by various actors. As Rogers argues (Rogers, 1995:5): 'Diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system.' Since the diffusion stage appears to

be a crucial fourth innovation stage, the present research distinguishes between the initiation, development, implementation and diffusion stages.

It is important to note – however obvious it may seem – that innovations cannot be considered linear processes in the sense that each step or phase has a clear beginning and end and will be followed by a subsequent step or phase. Innovation entails a complex and multi-dimensional process that cannot be reduced to clear-cut linear stages (e.g. Smits, 2000). In addition, the innovation process has to be considered as being something iterative (see also Sabatier for innovation policy processes, 1993); a continuous cycle of ideas, development, implementation, diffusion. Nevertheless, categorising innovation stages in research can help to structure, recognise and identify the mechanisms of various variables that affect the innovation. In the present research, the distinction between innovation stages is used to compare and analyse the influence of the Advocacy Coalition Framework and social capital variables on joined-up ICT innovations.

2.7 TOWARDS AN INTEGRATED FRAMEWORK

Previous sections have shown that unravelling network characteristics and dynamics may contribute to the operationalisation of the subsystem of the Advocacy Coalition Framework. When integrating the Advocacy Coalition Framework and social capital theory, particularly the policy subsystem element of the framework changes (see right box, figure 2 below). Coalitions and belief systems as depicted by Sabatier et al. (2007:202, see also figure 1, paragraph 2.1) can be considered as the *network characteristic* described in social capital theory as 'group closure'. Group closure describes the extent to which actors form cliques (and thus coalitions) and the extent to which they share certain frames of references (and thus belief systems), which shape their behaviour (see also section 2.5.1). The policy brokers as described by Sabatier are more generally referred to as 'brokers' in social capital theory since they do not only bridge policy, but also knowledge and human resource gaps. In addition to the coalitions, belief systems and the broker's position established by Sabatier, social capital theory also identifies other network and tie characteristics that influence the policy or innovation process, namely the strength of the ties, their heterogeneity and the level of interpersonal trust.

The network and tie characteristics yield certain actor strategies. Group closure, for instance, can cause conformity to dominant perceptions, while heterogeneity can generate multi-disciplinary or inter-sectoral collaboration and the broker's position may be used to reach consensus. Based on the strategies chosen by (groups of) individuals, certain decisions by government authorities are made which, in turn, generate institutional rules, resource allocations and appointments. With regard to *resource flows*, there is another difference between the Advocacy Coalition Framework and social capital theory. Whereas Sabatier et al. perceive resources as characteristics of a coalition, social capital theory attributes resources to individuals. Individuals can participate in several coalitions at the same time (or in no co-

alition at all), and hence they can use their resources, depending on their interests and goals, to cause certain resource flows. The rules, resource flows and appointments result in certain policy outputs and impacts, which, in turn, may affect the policy subsystem and/or cause external events. For instance, a limited reduction of carbon emission may affect public opinion (disappointment about the policy instruments used) and may change the network and tie characteristics since new parties may be involved to increase the environmental policy's effectiveness.

The present research applies this model to a *network in a specific sector*, rather than to a nation or society as a whole. However, the framework factors (parameters and events) as initially described by Sabatier et al. (1999) are mostly applied on a macro (national) level (e.g. Jenkins-Smith and St. Clair, 1993, Sabatier and Brasher, 1993). When joined-up ICT innovations are the study's unit of analysis, these parameters and events have more explanatory power if they are considered on a meso (sectoral) level. For instance, in the development of electronic healthcare records, it is not the general legislative framework, but the specific healthcare regulation that is relevant. In addition, it is not the gross national product that is most crucial, but the availability of resources in the healthcare sector. And it is not only the general norms and value systems in society that are interesting (e.g. average level of trust citizens have in governments), but also tangible values within the healthcare sector (e.g. extent to which innovations are valued).

This application of the model on a meso level yields another change since the 'long-term coalition opportunity structures' of the model (see top centre of box in the traditional Advocacy Coalition Framework, depicted in figure 1, paragraph 2.1) is a macro variable. Sabatier et al. use this element of their model to distinguish between various democratic systems, such as the UK's Westminster model and more consensual systems, such as the Dutch one. This variable may yield certain governing structures in a specific sector (e.g. the involvement of civil society groups such as trade unions) but is not a characteristic of a sector. It is a characteristic of a nation's democratic system. Therefore, this element will not become part of the framework in this research, but it may become manifest through the involvement of certain actors in the policy subsystem. In other words, the object of study in this research is not a nation's democratic system, but the involvement of actors in the policy subsystem, which can be more pluralistic in consensual systems and less diverse in Westminster systems.

In summary, the central line of reasoning underpinning the model is that the relatively stable parameters (e.g. available resources, existing legislation) and external events (e.g. economic changes and changes in public opinion) will provide constraints and/or resources and therefore also the context for innovation in the subsystem. In the subsystem, network and tie characteristics will determine the innovation strategies, and these, in turn, affect the decisions, rules, resource allocations, appointments, innovation outputs and impacts. Figure 2 below gives an overview of the integrated model used for the present research.

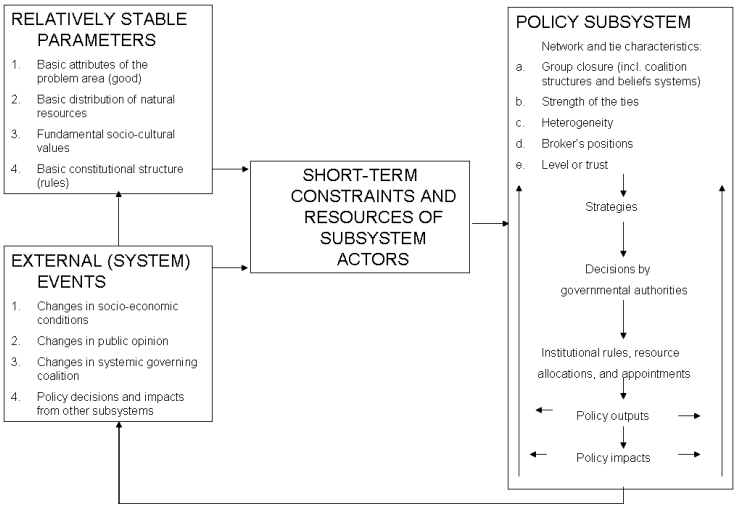

Figure 2. Integrated model of Advocacy Coalition Framework and social capital theory

2.8 THEORETICAL PROPOSITIONS

The following propositions on the integration of social capital theory and the Advocacy Coalition Framework and the mechanisms of social capital theory can be derived from previous sections:

1. Social capital theory can substantially enrich the Advocacy Coalition Framework in the sense that it reveals the effect of network characteristics and dynamics on the innovation process.
2. Group closure encourages the reproduction of ideas and hence provides limited access to new ideas and strategies and limits the creation of innovations.
3. Group closure stimulates the diffusion of innovations that are highly compatible with the norms and values of the closed group.
4. Weak ties extend to a larger number of individuals and thus information on innovations can be spread among a larger number of people when passed through weak rather than strong ties.
5. Strong ties may stimulate the creation and adoption of highly uncertain innovations.
6. Heterogeneity of the subsystem enhances the innovative capacity of the subsystem.
7. Brokers have a significant influence on the direction innovation takes and can hamper or stimulate the innovation process.
8. Trust supports high-risk innovation processes and can be partly compensated by interdependencies, control mechanisms and/or contractual arrangements.

As becomes clear from the overview of theoretical propositions, most assumptions formulated concern social capital theory (seven out of eight – propositions 2 to 8). This focus on social capital results from the fact that most scholarly criticism of the Advocacy Coalition Framework concerns the subsystem (see section 2.3), and social capital theory is used in this thesis to further operationalise the subsystem of the Advocacy Coalition Framework. In addition, – as stated in sections 2.4 and 2.5 – social capital theory is very recent, so its propositions still need to be tested. Consequently, a dominant focus is on the subsystem and social capital theory. The following chapter explores a specific case of joined-up innovation, namely the joint development of eIDM systems in the public sector.

3

eIDM systems in the public sector

This chapter introduces and examines in detail the specific case of joined-up ICT innovation in the public sector. More specifically, the case selected is the cooperative development and implementation of an electronic Identity Management system (often referred to as eIDM system) by various government agencies. The first section explains the 'joint' and 'technological innovative' character of this case. The second section describes the perceived need for eIDM systems. The ambition of governments to develop one shared solution for all government transactions is discussed in the third section. The fourth section provides insight into the status quo of eIDM systems in European countries. The question of which barriers hinder the take-up and implementation of eIDM systems in European countries will be addressed in the fifth section. The final section concludes with the premise that revealing the influence of social capital may help to further explain the limited progress made in various countries.[25]

3.1 EIDM SYSTEMS AS JOINED-UP ICT INNOVATIONS

The cooperative development and implementation of an electronic Identity Management (eIDM) system by various different government institutions has been chosen as the specific joined-up ICT innovation to be studied in this research. An eIDM system is a means of electronically and officially proving one's identity in his/her interaction with businesses or governments. It enables end-users, for instance, to access secured databases (e.g. bank accounts), to sign electronic documents (e.g. tax forms) and to obtain digital products (e.g. building permits). There are multiple types of eIDM systems; examples are an electronic identity card (smart card) or a username and password. eIDM systems have been chosen as the innovation case in this research, firstly, because the creation of eIDM systems will be crucial for governments and their clients to fully exploit the potential of ICTs. Over the past few years, more and more governments have recognised that eIDM systems are key innovations for the further development of electronic services to citizens and businesses. Several studies demonstrate that by applying eIDM systems governments can make a significant step forward in their attempt to

25 All websites mentioned in this chapter have been accessed between September 2009 and February 2010.

provide digital services in the sense that they can provide transactional services and thereby decrease transaction costs for both providers and users (the next section provides a more comprehensive explanation of the importance of eIDM systems).[26]

Secondly, eIDM systems have been selected as the specific case to be studied as it meets the criteria of a *joined-up ICT innovation* in the public sector. In the introductory and theoretical chapter of this study 'joint' is defined as a cross-border innovation. In other words, an innovation that is collectively implemented by several organisations. Most European member states are developing and implementing a national eIDM system for the identification of citizens and businesses, a process that multiple institutions have undertaken in collaboration with each other. The development of a national eIDM system can thus be considered a *joint* project. In addition, the development of an eIDM system can be perceived as an '*ICT innovation*' as it entails the development, introduction and incorporation of (a set of) new information and/or communication technologies, which over time represents a substantial discontinuity with the past. Although eIDM technologies have already been developed in the private sector, the application of those systems in the public sector requires further technological development since technical requirements for eIDM use in the public sector differ from the requirements for eIDM use in the private sector (e.g. due to privacy regulations). New technology has to be developed, and so this process can be characterised as an ICT innovation. Furthermore, the implementation results in a substantial discontinuity with the past since it reforms government processes and products. The introduction of an eIDM system in government not only implies a change of the identification and authentication process, but also the digitalisation of paper-based back-office processes.

3.2 THE PERCEIVED NEED FOR EIDM SYSTEMS

Electronic systems that manage identification are generally perceived by Western governments as a cornerstone of the implementation of all kinds of e-Government services, for both citizens and businesses.[27] As the demand for online government services has been growing over the years, the need for secure online identification of persons and organisations has become more urgent. In addition, an increased need has emerged for the verification of formal application requirements, such as the date on which a formal document has been submitted. Registered letters are still required in many formal exchanges between citizens or businesses and public administrations, which makes a digital 'time stamp', guaranteed by a third trusted

26 See, for instance, European Commission, (2007) 'European e-Government 2005-2007, Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels and European Commission, (2009), 'i2010 e-Government Action Plan Progress Study', Brussels.

27 See, for instance, EU policy, http://ec.europa.eu/information_society/activities/e-Government/policy/key_enablers/eid/index_en.htm.

party (much the same service as provided by post offices with registered letters) crucial to stimulate the take-up of online services.

The development and take-up of eIDM systems across Europe is heavily stimulated by the European Commission. Besides creating a road map for a pan-European eIDM framework by 2010, the European Commission has funded studies on eIDM progress made by member states and large-scale pilots of eIDM implementations. The European Commission writes the following about eIDM systems:[28] 'A reliable system of eIDM means citizens, businesses and government departments (even in different Member States) can identify themselves and certify their transactions accurately, quickly and simply. Widespread confidence in eIDM will enable the day-to-day transactions between public agencies and people and businesses to move on-line. That move will lead to gains in efficiency in public services, and corresponding gains in time and money for citizens and businesses through simplifying their dealings with government agencies. Making sure that systems are interoperable is also a critical part of reliable eIDM. EU-supported ICT projects aim to help regions and member states develop e-Government services which, while meeting local needs, are capable of working with systems from other regions and countries in Europe – something that member states working in isolation would struggle to achieve otherwise.'

The types of eIDM systems are as versatile as the organisations (e.g. governments, but also banks, employers, airlines) that implement them. Not surprisingly, there is no common agreement on the definition of an 'eIDM system'. Yet, Preneel (2005) et al. proposed the following definition for an identity management system (IDM system) based on various descriptions in literature: 'The organisational and technical infrastructure used for the definition, designation and administration of identity attributes.'[29] Adding an 'e' of electronic to Preneel's definition adds a limiting factor to the definition: the technical infrastructure used for the definition, designation and administration of identity attributes. Preneel et al. (2005) also developed a typology of IDM solutions containing three key categories: smart cards, biometrics, and unique identifiers.[30] Smart-card solutions work with a pocket-sized card that provides information about the card holder's identity. Solutions that use biometrics identify people by recognising intrinsic physical or behavioural traits. Unique identifiers are for the most part serial numbers that refer to a specific person or business. Obviously, these three categories do not do justice to the broad range of existing solutions. Yet, it is beyond the scope of this research to fully describe all possible solutions.

28 See, for instance, European Commission, (2006), 'A Roadmap for a pan-European eIDM framework by 2010', Brussels.

29 European Commission, (2005), 'Common Terminological Framework for Interoperable Electronic Identity Management', consultation paper, Brussels.

30 https://www.cosic.esat.kuleuven.be/modinis-idm/twiki/bin/view.cgi/Main/SolutionCategories

3.3 SHARED EIDM SYSTEMS

Examining the policies of European member states' development and implementation of eIDM systems makes it clear that most governments are striving to create one eIDM solution for all transactions between citizens or businesses and government.[31] In policy documents on the development of the Dutch eIDM system DigiD (once called the National Authentication Facility), the Dutch government stresses the need for one solution for all government transactions: 'Although there are many good eIDM initiatives by different government organisations, we face the risk of burdening citizens with dozens of passwords, usernames and codes.'[32] The objective of the Ministry for Investment, Industry and Information Technology of the Maltese government is to develop an eIDM system that can be used for various e-Government services.[33] In Belgium, the government's strategy is to create a basic eID application for persons that supports various interactions with governments, such as the submitting of declarations at the online tax office, placing a formal request for a building permit or accessing personal (e.g. healthcare) records.[34] Reviewing the various eIDM policy documents of European member states makes it clear that the vast majority of governments aim to develop a basic eIDM system that is used by multiple government organisations.

The 'one solution for all government transaction' ambition of European governments implies that separate government organisations have to jointly develop and implement an eIDM system. Within European member states, governments have applied several cooperative models to create an eIDM system. Some governments created inter-departmental working groups to develop a - by various ministries - shared eIDM solution. In other instances informal networks emerged which tried to establish a basic eIDM system in a more informal way. Whereas the cross-agency eIDM project of the Maltese government was highly coordinated by one central actor (the Ministry for Investment, Industry and Information Technology), in the Netherlands an informal eIDM advocacy group emerged in which government practitioners of several social security agencies (e.g. Social Security Bank, BKWI, Tax Office) participated.[35]

Several studies on the progress made by European countries in developing and implementing a shared eIDM system show that – although many member states have had an eIDM policy since the 1990s – the vast majority of countries have not yet reached the stage of having a fully developed and adopted eIDM system.[36] It seems that the process towards a jointly accepted solution is complex and

31 See, for instance, the country profiles of the IDABC eID Interoperability for PEGS programme.
32 BKWI, (2003), 'Op weg naar een Nationale Authenticatie Voorziening', Amsterdam.
33 IDABC, (2007), 'European e-Government Services, eID Interoperability for PEGS, National Profile Malta', Brussels.
34 See, for instance, IDABC, (2007), 'European e-Government Services, eID Interoperability for PEGS, National Profile Belgium', Belgium.
35 See, for instance Huijboom (2007).
36 See, for instance, European Commission, (2007), 'European e-Government 2005-2007, Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels.

cumbersome. Several barriers to a joint development of an eIDM system have been mentioned in the relevant literature, among which a missing regulatory framework, the lack of interoperability of applications and privacy concerns.[37] The following two sections, respectively, discuss the current status quo of eIDM in European member states and the key barriers to eIDM development and implementation.

3.4 STATUS QUO OF EIDM SYSTEMS IN EUROPE

As stated in the second section of this chapter, eIDM is repeatedly specified as one of the key enablers for electronic government in several EU policy documents. In 2005, the EC's i2010 Strategy stressed that e-Government Identity Management in EU member states should be addressed and that particular attention should be paid to interoperability issues as well as future needs, without ignoring differences in legal and cultural practices and the EU framework data protection (European Commission, 2005).[38] The e-Government Action Plan, building on the i2010 Strategy, set the following objective: 'By 2010 European citizens and businesses will be able to benefit from secure and convenient electronic means, issued at local, regional and national levels, and complying with data protection regulations to identify themselves to public services in their own or in any other Member States' (European Commission, 2006).[39]

EU member states have agreed on a roadmap for 'the implementation of national eIDM systems, the development of a common eID framework for the equal treatment of national solutions, and the development of eID role management, personal data ownership models and federated eID management, ensuring mutual recognition of national eIDs in Europe by 2010' (European Commission, 2007:53).[40] This ambition has been translated by many governments into national policy. A survey among European member states carried out by (among others) the Danish Technological Institute (DTI) and the TNO Research Institute reveals that no less than 92% of the member states have defined eIDM policies.[41] Despite this high number of countries with eIDM policies, merely 32% of these countries had been able to fully realise their eIDM policy in 2007. In addition, the DTI and TNO survey shows that there are great differences between countries regarding the pace with

37 See, for instance, Backhouse (2006).

38 European Commission, (2005), 'i2010 – A European Information Society for growth and employment', Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Brussels.

39 European Commission, (2006), 'i2010 eGovernment Action Plan: Accelerating eGovernment in Europe for the Benefit of All', Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Brussels.

40 European Commission, (2006), 'A Roadmap for a pan-European eIDM framework by 2010', Brussels.

41 European Commission, (2007), 'European e-Government 2005-2007, Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels.

which they implement their policies. Four stages of the 'eIDM innovation process' can be distinguished, namely: (1) conceptual design phase, (2) development/roll-out phase, (3) update/review phase and (4) consolidation phase.[42]

Member states in the *conceptual design phase* have not yet deployed any large-scale eIDM solution, but are still examining the available options. The *development/roll-out phase* consists of the actual development and deployment of the solution. Member states in this phase have (virtually) completed the design work, but have not yet established a significant user base, nor are popular and publicly accessible services available yet. In the third, *update/review phase*, existing eIDM solutions are being reviewed and modifications/updates are being considered. This is typically the case with member states that have implemented basic solutions (e.g. username/password portals) some years ago, and which are now refining such solutions, e.g. through the integration of a public key infrastructure (PKI) or smart card technology. In the fourth and final stage, the *consolidation phase*, only minor changes to the existing eIDM infrastructure are considered, but the infrastructure itself is fairly mature, and presents a longer-term solution.

The following table, from the e-Government Action Plan Progress Study of the European Commission,[43] gives an overview of the phases in which the national eIDM systems of European governments found themselves in 2009:

Table 1. Phases of eIDM systems for each member state. Source: e-Government Action Plan Progress Study, European Commission, 2009

Conceptua l/ Design = 5	Development/ Roll-out = 7	Update/review = 10	Consolidation = 8
Croatia	Bulgaria	Germany (2007:	Austria
Cyprus	Hungary (2007:	development / roll-out)	Belgium
Czech Republic	conceptual / design)	France	Denmark
Greece	Latvia	Iceland	Estonia
Romania	Lithuania	Ireland	Finland
	Poland (2007:	Luxembourg (2007:	Italy
	conceptual/ design)	conceptual / design)	Spain
	Slovakia (2007:	Norway	Sweden
	conceptual / design)	Portugal (2007:	
	Malta	development / roll -out)	
	UK	Slovenia	
		Netherlands	

42 MODINIS (2006), 'Study on Identity Management in e-Government, The Status of Identity Management in European e-Government Initiatives'; MODINIS, (2007), 'Study on Interoperability at Local and Regional Level'; and European Commission, (2007), 'European e-Government 2005-2007, Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels.

43 European Commission, (2009), 'i2010 e-Government Action Plan Progress Study', (SMART 2008/0042), Brussels.

The table shows that in 2009 around 59% of the European member states (Croatia, Iceland and Norway excluded) had an eIDM system rolled out, and approximately 30% had a completely developed eIDM system in place. In their study, the European Commission concludes that there have been barely any significant changes in the development stages of countries' eIDM systems since 2005. As they state in their 2007 progress report:[44] 'In general, this [lack of progress] can be explained by the fact that the development and implementation of eIDM projects are relatively complex and entail considerable time for development and implementation.'

3.5 KEY BARRIERS TO THE IMPLEMENTATION OF EIDM SYSTEMS

Evaluation studies show that the limited progress made with the implementation of eIDM systems in European countries is related to a number of barriers afflicting almost all eIDM projects. The most frequently mentioned barriers have a *technical* character. Backhouse (2006:568), for instance, discusses the problem of fragmented identifiers; every database has its own identifiers, and this multiplicity obstructs the cross-matching and cross-referencing of the stored information. In other words, identities used in one system may be useless in another. In addition, many technical standards have to be taken into account when deploying an integrated e-Government IDM solution.[45] In most countries the various sectors have different standards, and a major challenge is to find a technical solution that respects the large number of choices that already have been made.

In addition, *legal* difficulties have been recurrently identified as barriers to a shared eIDM system. The technical concepts of several national eIDM solutions of European member states require a new regulatory framework. For instance, delegating authorisation can be technically simple but may imply a change in existing legislation.[46] Moreover, many European member states report that privacy legislation forms a constraint for the development of an eIDM system. European regulation also requires all the European member states to have legislation on privacy (see, for instance, Backhouse, 2006:270). An additional problem to the legal demand for the protection of privacy is that there does not appear to be any manner to objectively gauge the reliability and trustworthiness of most electronic identification mechanisms. This is not only a privacy problem (people stealing someone's identity – often referred to as identity theft), but also an organisational one, since the service provider is not able to determine whether the outcome of an entity authentication process is sufficiently reliable to allow a user access to its services.

44 European Commission, (2007), 'European e-Government 2005-2007, Taking stock of good practice and progress towards implementation of the i2010 e-Government Action Plan', Brussels.
45 https://www.cosic.esat.kuleuven.be/modinis-idm/twiki/bin/view.cgi/Main/KeyIssues
46 https://www.cosic.esat.kuleuven.be/modinis-idm/twiki/bin/view.cgi/Main/KeyIssues

This brings us to the last type of barrier that is frequently mentioned: *organisational* difficulties. Many e-Government services allow the user to delegate certain authorisations to another user. It may be difficult to manage such a system, as it needs to be made absolutely clear which activities are covered by the delegation, and therefore policies are often needed that are equally transparent.[47] Furthermore, government agencies, which already have put an eIDM system into place, will be inclined to defend their choice, as they have made substantial investments to develop the solution. Lastly, in a joint development of an eIDM system, there may be a long dispute about the funding and responsibilities of and influence on the development and implementation of the eIDM solution.

3.6 MISSING SOCIAL FACTORS

Most studies on drivers and barriers for the development and implementation of eIDM system noticeably focus primarily on technical, legal and organisational incentives and barriers. However, social factors also may have a significant influence. As stated in the previous chapters, the interpersonal relations between governments of separate government agencies may influence the innovation process. For example, Van den Broek (2008) discovered, during his study on the influence of strong and weak ties on the development of the eIDM system VETUMA in Finland, that strong ties between government practitioners of separate government agencies were used to expand the number of partners who supported the development of VETUMA. As van den Broek states: 'Most of the stakeholders in the core network knew each other quite well before the cooperation, especially the members from the metropolitan municipalities. This resulted in an informal and constructive atmosphere and cooperation mainly based on trust.'

Research by Van Dijk (2007) shows that the Dutch eIDM system, DigiD, was launched by an advocacy group of several government organisations in the social security sector. Although the Dutch Ministry of the Interior was already developing a national eIDM solution, based on PKI technology, the advocacy group decided to develop a solution themselves, with the aim of diffusing the solution among partners and making it the national standard. The main reason to develop an eIDM system themselves was that the members of the advocacy group found the PKI solution of the Ministry too complex. The DigiD system of the advocacy group was rapidly disseminated through the networks of the members of the advocacy group. Van Dijk concludes that one of the key factors stimulating these kind of – what he calls chain – innovations is the interpersonal network of the participants in the joint innovation, both at a strategic and operational level (ibid, p. 53).

Social capital factors, such as existing ties, the strength of the ties and the presence or absence of trust, thus seem to affect the innovation process of the joint development of eIDM systems. However, how these factors precisely influence

47 https://www.cosic.esat.kuleuven.be/modinis-idm/twiki/bin/view.cgi/Main/KeyIssues

the innovation process in its different phases remains unclear. In this thesis, four cases are selected in which a shared eIDM system has been developed by several partners in the public sector. For each of the cases, the influence of social capital variables – within the broader Advocacy Coalition Framework – is examined. However, first the methodology of the case studies is explained in the next chapter.

4
Methodology

The theoretical propositions defined in the final section of the second chapter are empirically tested in the case of joint eIDM systems, as described in the previous chapter. This fourth chapter of the study outlines the methodology used for the empirical testing of the propositions. The first section outlines and substantiates the chosen research strategy of the case study. The main argument put forward is that Sabatier et al. (1993) emphasise the importance of case-study research when applying the Advocacy Coalition Framework and that – in addition – case-study research supplements the predominantly quantitative research in the social capital field. Case-study research provides a more in-depth and therefore more profound understanding of the concrete manifestation of social capital. The number of case studies needed to test the theory are explored in the second section. The third section selects four case studies of joint eIDM innovation in the public sector based on selection criteria. The justification of cross-country comparative research as applied in the present research is provided in section four, and section five provides insight into the triangulation strategy used for the data collection. Multiple methods of data gathering are used, such as desk research, a tie assessment and interviews. The chapter concludes in sections five and six with a description of the data analysis and the case format used.

4.1 A MULTIPLE CASE-STUDY RESEARCH DESIGN

Whereas many scholars do not explicitly articulate the methodology that has to be used to apply their conceptual framework, Sabatier and Jenkins-Smith (1993) have published an overview of their preferred research methodology for the application of the Advocacy Coalition Framework.[48] They contend that the hypotheses generated by the framework are best tested by conducting case-study research (1993:57), i.e. a longitudinal examination of a single instance or event (e.g. occurrence of specific policy change or innovation). Traditional case studies, consisting of document research, interviews and analyses of others' studies, for example, do most justice to the complexity and the great variation of (e.g. legal, cultural, financial and political) factors identified by the Advocacy Coalition Framework,

48 See, Sabatier, et al. (1993).

and thereby are most eligible to assess the impact of those factors and test the assumptions underlying the framework.

In addition, it can be argued that case-study research is needed to advance social capital theory. There are many studies that mathematically model or quantitatively measure elements of social capital (Erdös and Rényi, 1959; Cowan and Jonard, 2002; Watts, 1999; Jackson and Wolinsky, 1996; Mason et al., 2005). These scholarly contributions provide valuable insight into specific mathematical rules (such as the maximum number of handshakes that separates two people) or (causal) relations between social capital and the achievement of specific goals (such as personal attainment). However, they can be supplemented by a more empirical understanding of the various mechanisms of social capital in the innovation process. Klijn (2002:277), for instance, argues that as regards the variable trust in particular case studies may provide a better understanding of its dynamics and development. Although there are ample theories on trust in the relevant literature, an analysis of tangible cases is needed in order to reveal the actual manifestation and impact of trust within networks. Case-study research can also contribute to increased insight into the concrete mechanisms of other social capital variables. The case-study method can function as a magnifying glass and reveal micro dynamics in the process (e.g. interdependencies and coalition formation) and the consequences of these dynamics (e.g. decisions made and activities undertaken). The empirical evidence generated from the case studies can be used to explain certain innovation outcomes and to test and sharpen the propositions advanced in theory. Consequently, the research method of the multiple case-study approach will be applied in this research.

A well-known critique of the case-study method is that it is difficult to draw general conclusions from a limited number of case studies (e.g. Leeuw, 1999). However, focusing on the mechanisms of Advocacy Coalition Framework and social capital variables makes it possible to define some general theoretical propositions (Yin, 1994:10). The Advocacy Coalition Framework and social capital theory, as expounded in the second chapter, is used as a template for comparing the empirical results of the cases studies. For each theoretical proposition, a verification of theoretical replication take places, that is, an analysis of the confirmation or rejection of the proposition by various cases. If some of the cases refute a proposition, the theory will have to be modified. This replication logic has to be distinguished from the sampling logic normally used in surveys (ibid, p. 47). According to the sampling logic, a larger pool of respondents (or subjects) is represented by a smaller number of respondents (or subjects). In the replication logic – by contrast – the focus is not on the replication of samples (e.g. the number of cases found) but on the replication of theory in specific cases (e.g. theoretical mechanisms, ibid, p.10). The case study does not represent a 'sample', and the goal of this research is not to enumerate frequencies – in other words to statistically generalise – but to expand theory and subsequently analytically generalise (see also Lipset, Trow, and Coleman, 1956, pp. 419-20).

In order to be able to analytically generalise theory, 'the most similar cases' are selected, cases which are as analogous as possible – except for the independent

variable social capital. All selected cases concern jointly developed and implemented eIDM systems by government institutions of Western democracies. As a result, independent variables that may influence the innovation process – not being social capital variables – are as stable as possible. For instance, as all cases entail the same kind of ICT innovation (namely, electronic identification management systems), technological variables that may influence the innovation process (such as limitations of identification techniques) are in all cases present or absent. The same goes for institutional factors. As all cases concern the development and implementation of eIDM systems by government agencies, institutional factors that may influence the innovation process (such as a lack of commercial incentives) are most similar in all cases. In addition, legal factors are as stable as possible since the implementation of eIDM systems generates comparable legal questions in all cases (e.g. privacy infringements), and thus these legal aspects may affect the innovation process in a similar way.

The cases, however, vary on the independent variable social capital, since this variation may reveal specific social capital mechanisms in the subsystem of the Advocacy Coalition Framework and thereby optimally support the testing of the propositions (in particular propositions 2 to 8). More specifically, cases are selected that vary with regard to dimensions 'the general level of trust within the society' and 'the extent to which a democracy can be labelled as consensual' (for an elaboration of these dimensions, see section 4.3 of this chapter). This is done because the precise manifestation of social capital in innovation processes may be different in a low-trust society than in a high-trust society or in a consensual or majoritarian state. For instance, whereas in low-trust countries actors may be inclined to rely on existing strong ties, in high-trust countries cooperation between actors with weak ties may emerge more spontaneously. In addition, differentiation in the consensual or majoritarian state models may reveal different manifestations of trust, ties and network positions. While opinion brokers may be needed in consensual networks to mediate between interests, their position may be less strong in majoritarian networks. The following picture provides an overview of the independent variables that are relatively stable and the independent variables that differ in the cases:

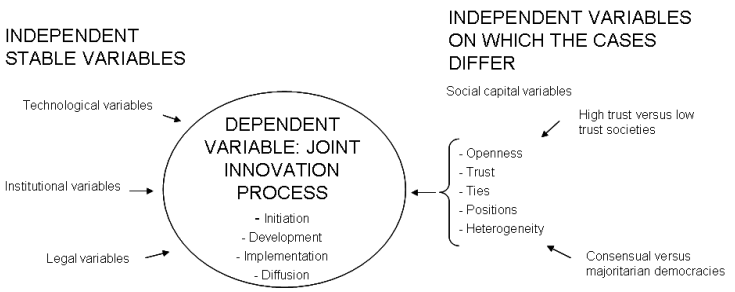

Figure 3. Overview of dependent and independent variables

As explained above, technological, institutional and legal variables (left-hand side of the figure) that may influence the joint innovation process (centre of the figure) are kept relatively stable and cases will vary on two macro socio-cultural dimensions, namely 'high/low trust societies' and 'consensual/majoritarian democracies' (right-hand side of the figure). By varying these two macro dimensions, it is highly likely that social capital variables within the Advocacy Coalition Framework subsystem – such strength of the ties within the network – will also differ. Although all independent variables (technological, institutional, legal and social capital) influence the dependent variable of 'joint innovation process', social capital patterns will be the most visible since all other variables are as stable as possible.

4.2 NUMBER OF CASES STUDIED

An important question that has to be answered when a multiple case-study approach is used, is the number of case studies that have to be analysed in order to be able to analytically generalise theory. There is no common agreement in the literature on the number of cases needed for a multiple case-study approach (Patton, 1990: 148). Yet it is generally accepted that the number of cases can be determined based on a) depth of the of the case-study inquiry, b) the extent to which cases differ, and c) the extent to which theories are explorative or fully developed (Shakir, 2002; Yin, 1994; Miles and Huberman, 1994). An indication of the precise number of cases needed can be generated by combining the work of Yin (1994), Shakir (2002) and Patton (1990). If the focus of the research is narrow, the difference between cases limited, and if the theories rival each other, the number of cases needed is between three and four. If the research is broad, the difference between cases high and the theories slightly different, then the number of cases required is between six and eight.

Table 2. Indicators for the number of case studies needed, based on Yin, Shakir and Patton

Indicator	3-4 case studies	6-8 case studies
Depth of the study	High	Low
Differences between cases	Low	High
Development of theory	Explorative	Largely developed

To start with the depth of the case studies: whereas a smaller number of cases is sufficient for in-depth research, a larger number is required for a broad study (Shakir, 2002: 194). This is because the aim of in-depth studies generally is to thoroughly scrutinise a complex of variables in a specific situation, whereas the aim of broad studies is to compare the manifestation of only one or two variables in multiple situations or events. The second indicator is the extent to which the independent variables differ on variables other than the variable of interest. If the cases differ on many variables (other than the variable being studied), it is more difficult to analyse the precise effect of the variable of interest than is the case when other variables are relatively stable (Yin, 1994:46-50). The varying factors

are mutually interrelated, and more case studies are needed to reveal interrelations and variations. The last indicator for choosing the appropriate number of case studies is the extent to which the theory has been developed (Yin, 1994:50). If a theory slightly differs from another theory (and is thus a largely developed theory), more evidence (confirmation by multiple cases) is required than when theories are highly divergent and theoretical exploration is needed.

Applying these indicators to the present research makes it clear that three to four case studies are needed to be able to analytically generalise the propositions outlined in the theoretical chapter of this research. The depth of the study is high; a complex of 13 variables (eight parameters and events of the Advocacy Coalition Framework and five social capital variables) has to be examined for each case study. Furthermore, the differences between cases in terms of variables that are not subject of the study are low. As stated in the previous section, cases will be selected which are as analogous as possible; which entail similar types of ICT innovation, in similar public service sectors and which have relatively stable contextual factors. Finally, social capital theory – used to operationalise the subsystem of the Advocacy Coalition Framework – is highly explorative. Theoretical propositions are disputed, and thus the theory is far from being fully developed. In conclusion, when comparing the research characteristics with the indicators it becomes clear that three to four cases should be sufficient to be able to apply an analytical generalisation.

4.3 SELECTION OF THE EIDM CASES

As stated in the previous section, the propositions described in the theoretical chapter are tested in four cases of joint development of an eIDM system by several governmental institutions. As most governments aim to develop one eIDM system for the whole public sector, it is important to select eIDM cases from different countries. In addition, to keep contextual factors (e.g. institutional structure, legislative framework) as stable as possible, Western countries are selected that are part of the European Union. In this section, the selection of four cases of implemented eIDM systems in European countries is based upon selection criteria generated from the Advocacy Coalition Framework and social capital theory, as expounded in the theoretical chapter.

The first criterion originates from one of the premises of the Advocacy Coalition Framework and requires that the case studied has to have occurred in the (recent) past. One of the key assumptions of the Advocacy Coalition Framework is that a time frame of a decade or more is necessary in order to understand the process of policy change. This criterion implies that the innovation has to have reached a certain stage of maturity. In other words, innovations that are still in the development phase cannot be selected since the influence of Advocacy Coalition parameters and social capital variables can only be assessed if the innovation is sufficiently developed and implemented. This criterion shortens the list of potential cases since

the e-Government Progress Study of the European Commission (2009)[49] revealed that only the following countries have reached the stage of a full roll-out:

Table 3. Consolidation phases of eIDM systems in European Countries. Source: EC, 2009

Consolidation = 8
Austria
Belgium
Denmark
Estonia
Finland
Italy
Spain
Sweden

Another study of the European Commission on eIDM systems, however, shows that the Swedish eIDM system used for interactions between governments and businesses or citizens is not a system created by the government, but by private organisations.[50] As the present research's unit of analysis is joined-up ICT innovation by *public sector agencies*, Sweden is outside the scope of present research and thus cannot be selected as a case study.[51] In addition, the National Self-Assessment Questionnaire of Malta, which has been used for the European Commission Progress Study, reveals that the Maltese eIDM solution in 2009 occurred in between the review and consolidation phases since a large number of services were already available through the eIDM system and many government institutions had put the national eIDM system to use.[52] Moreover, in other studies the Maltese eIDM system is recognised as being fully mature and in the consolidation phase. In a report by the European Commission (July 2009)[53] specifically on eIDM systems in European member states, it is stated, for example, that 'the Government of Malta has launched the eID as a software-based solution including a Non-Qualified Certificate based on PKI technology and capable of producing an advanced electronic signature.' Therefore, Malta will be added to the list of potential cases.

49 European Commission, (2009), 'i2010 e-Government Action Plan Progress Study', (SMART 2008/0042), Brussels.

50 IDABC, (2007), 'European e-Government Services, eID Interoperability for PEGS, National Profile Sweden', Brussels.

51 IDABC, (2009), 'European e-Government Services, Study on Mutual Recognition of eSignatures: update of Country Profiles, Malta country profile', Brussels.

52 The maturity of the Maltese eIDM system has been confirmed by the eID Interoperability for PEGS study (Update of Country Profiles study, Malta Country Profile) of the European Commission (July 2009), which states the following about Malta: 'To date, a very high percentage of the most widely used public services for citizens and businesses are being offered through the internet or mobile applications' and that the 'massive rollout of eServices through the portal, requiring eID as an authentication tool, has streamlined the horizontal integration of eServices.'

53 IDABC, (2009), 'European e-Government Services, Study on Mutual Recognition of eSignatures: update of Country Profiles, Malta country profile', Brussels.

The second criterion can be derived from social capital theory, namely a differentiation in the socio-cultural system of the country. Several scientists have argued that the precise manifestation of social capital factors (e.g. group closure, strength of ties, trust) depends on a society's specific socio-cultural characteristics. Fukuyama (1996:28), for instance, contends that: 'Social capital is not distributed uniformly among societies. Some show a markedly greater proclivity for association than others, and the preferred forms of association differ. In some, family and kinship constitute the primary form of association; in others, voluntary associations are much stronger and serve to draw people out of their families.' In this respect, he makes a distinction between low-trust and high-trust societies. The country-specific difference in the social characteristic of trust results in diverse manifestations of social capital in the sense that in high-trust countries people generally are more open to the cooperation with new partners, whereas in low-trust countries people more strongly rely on existing ties (Fukuyama, 1997:27). Fukuyama explains this as follows: 'Another term that I will use widely throughout this book is spontaneous sociability. […] In any modern society, organisations are being constantly created, destroyed and modified. The most useful kind of social capital is often not the ability to work under the authority of a traditional community or groups, but the capacity to form new associations and to cooperate with the terms of reference they establish.'

It would therefore be interesting for the present research to differentiate the variable of trust. It is highly probable that an examination of both low- and high-trust countries will reveal diverse social capital mechanisms. Whereas in high-trust countries spontaneous cooperation between weak tie partners may emerge, in low-trust countries organisations may be inclined to rely on existing strong ties. An important indicator that reflects the general level of trust within a country is the level of trust citizens have in other citizens. Several extensive studies have been conducted in this area. A leading study in this field is the World Values Survey, which pinpoints 'trust in others' as one of the indicators.[54] Of the countries that have an eIDM system in place, the following data can be collected from the World Values Survey, representing the average trust citizens had in fellow citizens between 1981 and 2007:

Table 4. Average trust of citizens between 1981 and 2007. Source: World Values Survey 2009

	Most people can be trusted	Can't be too careful	Total
Average	**35.8 %**	**64.2 %**	**33136 (100%)**
Austria	32.8 %	67.2 %	**2707 (100%)**
Belgium	31.5 %	68.5 %	**5405 (100%)**
Denmark	58.3 %	41.7 %	**3037 (100%)**
Estonia	24.0 %	76.0 %	**2961 (100%)**
Finland	55.5 %	44.5 %	**2543 (100%)**
Italy	31.4 %	68.6 %	**5185 (100%)**
Malta	18.8 %	81.2 %	**1801 (100%)**
Spain	34.2 %	65.8 %	**9497 (100%)**

54 http://www.worldvaluessurvey.org

Another socio-cultural aspect of differentiation that can generate a variety of manifestations of social capital is the extent to which a country has a tradition in consensual decision making. In other words: the practice of involving many parties that try to come to a shared understanding and agreement. In countries with these kinds of consensual models of decision making (often referred to by the term 'polder model'), the structure of the network, the positions within the network and characteristics of ties may be different from countries in which a few parties play a dominant role. In this respect, Lijphart (1999) made a distinction between consensus democracies and 'Westminster' democracies. In consensus democracies, multiple parties (e.g. minority parties) are involved in the process, which focuses strongly on achieving a compromise between those parties. Whereas in Westminster models, the majority parties (for instance in the parliament) strongly influence the outcome of a decision process.

In consensus democracies, social characteristics of innovation networks – such as strength of the ties, heterogeneity of the network, relational trust and positions within the network – may differ from the social network characteristics of innovation networks in Westminster democracies. For instance, in a network of partners whose ambition is to achieve a compromise, more trust may be needed than in networks where the governing majority decides. In addition, consensual networks may be more heterogeneous than majoritarian networks since more (e.g. minority) parties are involved. Also positions within these networks may differ; whereas the broker's position in consensual networks may be important for mediating between interests, this may be less relevant in majoritarian networks. In conclusion, the level of trust, positions, strength of the ties of people in networks where parties try to achieve consensus between all parties, may differ from the level of trust, positions and strength of the ties of people in networks where few parties are dominant.

Lijphart (1999) has defined two dominant dimensions in which the consensual democracy differs from the Westminster democracy: the executive-parties dimension and the federal-unitary dimension. The executive-parties dimension indicates how easy it is for a singly party to take complete control of the government. The federal-unitary dimension indicates the influence of local parties on national policy. The foremost important indicator for assessing whether a democracy is consensual or majoritarian is the effective number of parties (Lijphart, 1999:63): 'This first difference can also be seen as the most important and typical difference between the two models of democracy because it epitomizes the contrast between concentration of power on the one hand and power-sharing on the other.' The following table shows the effective numbers of parties in the countries that have an eIDM system in place and is based on Lijphart (ibid, pp. 76-7):[55]

55 Estonia was not covered by Lijphart and is therefore not part of the present research.

Table 5. Lijphart 1999, effective number of parliamentary parties, 1945-96.

	Mean	Lowest	Highest	Number of elections
Finland	5.03	4.54	5.58	15
Italy	4.91	3.76	6.97	14
Denmark	4.51	3.50	6.86	21
Belgium	4.32	3.45	6.51	17
Spain	2.76	2.34	3.02	7
Austria	2.48	2.09	3.73	16
Malta	1.99	1.97	2.00	6

Confronting the level of trust with the extent to which a democracy is consensual generates the following framework for selecting cases:

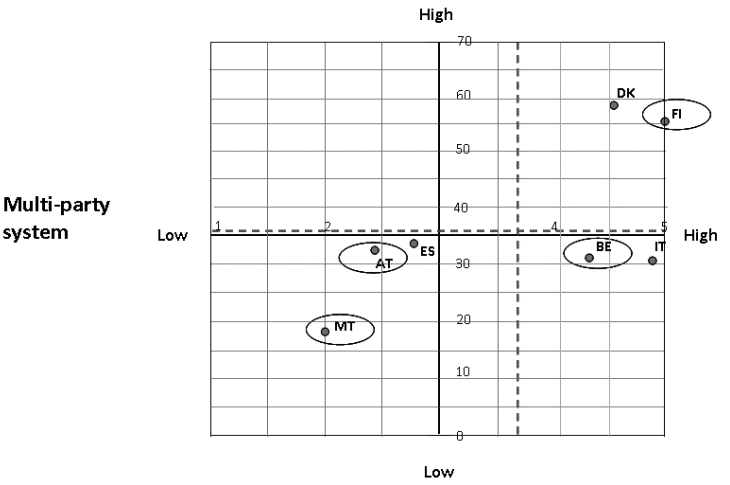

Figure 4. Confrontation level of trust and consensus between democratic systems

The vertical axis represents the level of trust citizens of a nation have in others (measured between 1981 and 2007), ranging from 0% to 70% (generic) trust in others. The horizontal axis represents the average effective number of a nation's parliamentary parties (measured between 1945 and 1996) ranging from one to five. The horizontal dotted line depicts the average percentage of trust of the seven countries selected so far (Austria, Belgium, Denmark, Finland, Italy, Malta and Spain) and the vertical dotted line the average number of effective parties of these seven countries.

As argued above, a significant variation on both axes is desirable as it may reveal diverse manifestations of social capital. Consequently, the countries which will be studied in the present research are:

- Malta (MT in figure 4 above), relatively *low* level of trust and *majoritarian* democratic model.
- Austria (AT); relatively *medium* level of trust and *majoritarian* democratic model.
- Belgium (BE), relatively *medium* level of trust and *consensual* democratic model (Belgium is chosen instead of Italy as it will be difficult to collect sound data for the Italian case due to language barriers).
- Finland (FI), relatively *high* level of trust and *consensual* democratic model.

4.4 CROSS-COUNTRY COMPARATIVE RESEARCH

As described in the previous section, cases are selected that vary on the macro socio-cultural dimensions '*high/low trust countries*' and '*consensual/majoritarian democracies*' and hence (similar) innovations are studied that were implemented in different countries. The main reason for conducting cross-national research is (as mentioned above) that a comparison of the manifestation of social capital in different countries can reveal a broader range of distinctive characteristics of social capital and therefore advance social capital theory. Besides this motivation, which focuses specifically on theory development, there are more generic reasons for choosing an internationally comparative method for the present research. For example, Jreisat (2005:232) argues that cross-national comparison extends our knowledge of how to explore, reflect and better understand universal public administrative action, behaviour and attributes. Comparative information and analyses can reveal global patterns and regularities in public administrative systems and therefore have a balancing effect that reduces internalised biases and prejudices. A more practical reason for conducting cross-country research is provided by Liou (2000:8), who argues that: 'Learning about systems of administration and governance through comparative studies is a prelude to selecting and adopting best practices to improve performance in all government systems around the world.' This line of argument has also been put forward by Khademian (1998:273), who argues that knowledge and information generated by the comparative method improves the capacity of government practitioners to observe, learn, and improve managerial performance.

Nevertheless, comparative research has often been criticised, particularly in the past two decades (Jreisat, 2005:234). There are three basic criticisms. Firstly, some critics blame comparative public administration studies for failing to deliver the promised advantages: for lacking a 'clear identity' and remaining 'ambiguous' (Henry, 1995; 32-3; Van Wart and Cayer, 1990) or because it 'began to fumble and fail in actual practice and as an academic discipline' (Subramaniam, 2000:557). Secondly, comparativists are accused of attempting to create grand theories which are too general to be scientifically useful. Early models – such as the agraria-industria model of Riggs (1957), which describes the transition from an agrarian towards an industrial society and subsequent change of public administrations – often capture gross distinctions between societies and are perceived by some scholars as having little relevance to reality. A third persistent criticism is that

comparative administration research remains conceptually fragmented and lacks synthesis (Jreisat, 1975).

Jreisat (2005: 237) addresses these problems by offering several solutions for dealing with these three criticisms. The problem of ambiguous research results, lack of clarity (first dominant criticism) can, according to Jreisat (2005:237), be solved by carefully defining the unit of analysis of the cross-country comparative research. As Jreisat states: 'Directly or indirectly, defining the unit of analysis marks research boundaries, tools and necessary data – all important functions in developing integrated conceptual schemes for cross-cultural analysis.' A precise formulation of the unit of analysis makes it possible to clearly define what should be compared, which diminishes the risk of ambiguous research results. Ambiguity can also be reduced by selecting 'most likely' cases, except for the variables which are to be studied (Hendriks, 2007:77). The second problem with cross-national research can be resolved by using what Jreisat calls 'middle-range concepts', instead of broad theories, to explain dynamics within public administrations. Middle-range conceptualisations (concepts which merely capture a few, specific hypotheses instead of many general hypotheses) enhance the specificity and relevance of findings (Jreisat, 2005:238). It is more difficult for the individual researcher to respond to the last criticism since the realisation of synthesis in comparative administration will be a matter of future harmonisation of research practices and a responsibility of the research community as a whole.

In terms of the present research, the unit of analysis is very specific, namely: *the joint development of eIDM systems by governments*. The innovation process of a tangible ICT innovation – eIDM system – in four countries is examined. In addition, the risk of ambiguous research results has been reduced since the cases studied are 'most likely' cases – all variables except for the social capital variables will be as similar as possible. Furthermore, the model used in the present research focuses specifically on the explanation of change processes in public administrations and captures a well-delineated set of parameters. In all cases, the same set of clearly defined factors will be studied, which increases the comparability of the cases. In conclusion, by (a) defining a very specific unit of analysis, (b) selecting most likely cases, and (c) using a tangible model to explain specific research findings, the dominant problems with comparable research are addressed and advantage can be taken of the enrichment of the research results.

4.5 DATA COLLECTION AND ANALYSIS

The case-study approach usually relies on three basic data-gathering methods, namely: document search, direct observation and systematic interviewing (Yin, 1994:8). However, as the subject of this research is an innovation that has occurred in the (recent) past (see premise 1 of Sabatier's Advocacy Coalition Framework in chapter 2), the method of direct observation is not applicable. Yet, to gain empirical evidence that is as sound as possible the research is not limited to document research and interviewing, but also assesses the presence and strength of ties

between involved actors. By using these various empirical foundations, triangulation takes place in the sense that findings and conclusions are corroborated by three types of sources, namely: documents, interviews and an assessment of the presence and nature of ties.

Three *types of information* are gathered to test the propositions as defined in chapter 2: (a) general information about the innovation process, output and impact, (b) data on the parameters and events of the Advocacy Coalition Framework, and (c) data on the social capital variables (see figure 5 below). The general information on the innovation process, output and impact provides an overview of how the process unfolded and what the results of the process were (e.g. the successive steps taken during the innovation process, the actors involved in the process and the crucial decisions made). The data on the parameters and events and their manifestation give insight into the influence these factors had on the innovation process in the subsystem. Data on the social capital variables and their manifestation - network characteristics (e.g. closure, strength of the ties, heterogeneity of the network, the broker's positions and level of trust) and dynamics (strategies, decisions and resource flows) – yield information about how those variables affected the innovation process.

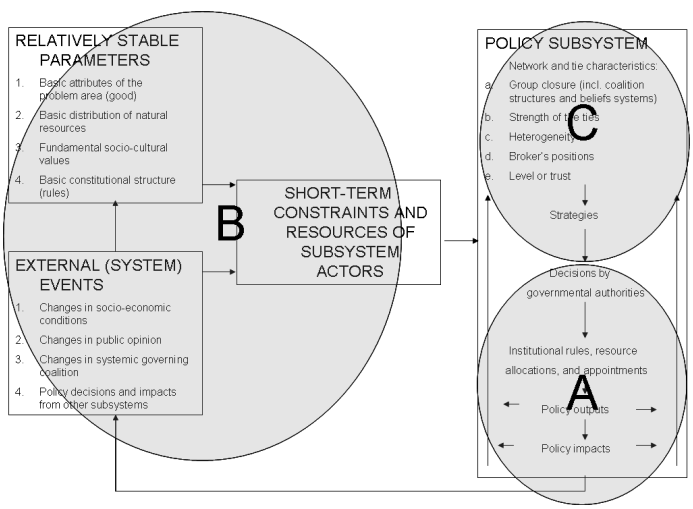

Figure 5. Types of information needed to validate the propositions

A combination of the data on the parameters and events (section b in figure 5 above), the social capital variables (section c) and the innovation process and results (section a), provides evidence to endorse or reject the first proposition, namely:

- *Social capital theory can substantially enrich the Advocacy Coalition Framework.*

In addition, data on the social capital variables (section c) and the innovation process and results (section a) can be used to confirm propositions two to eight, namely:

- *Group closure yields the reproduction of ideas and hence provides limited access to new ideas and strategies and limits the creation of innovation.*
- *Group closure stimulates diffusion of innovations, which are highly compatible with the norms and values of the closed group.*
- *Weak ties extend to a larger number of individuals and thus information on innovations can be spread among a larger number of people when passed through weak rather than strong ties.*
- *Strong ties may stimulate the creation and adoption of highly uncertain innovations.*
- *Heterogeneity of the subsystem enhances the innovative capacity of the subsystem.*
- *Opinion leaders have a significant influence on the innovation direction and can hamper or stimulate the innovation process.*
- *Trust supports high-risk innovation processes and can be partly compensated by interdependencies, control mechanisms and/or contractual arrangements.*

For each of the information types, specific methods have been applied to collect data, namely:

- *Innovation process, outcome and impact* (section a in figure 5). General information on the innovation process, outcome and impact – e.g. the successive steps, decisions made and actors involved – has been predominantly gathered through *desk research, examination of e-Government websites and interviews*. Documents which have been examined are (among others) policy documents, impact studies, benchmarks and user surveys. Several government websites have been consulted and studied, such as electronic service portals and eIDM websites. During the interviews, questions were posed on (amongst others) the strategies applied, decisions taken and innovation outcome (for the full interview format see Appendices). The data has been structured by using the typology of innovation phases outlined in section 2.6, namely the initiation, development, implementation and diffusion phase.

- *Advocacy Coalition Framework parameters and events* (section b in figure 5). Data on the Advocacy Coalition Framework parameters and events have mainly been collected through *desk research and interviews*. Documents which have been examined are (amongst others) technical descriptions of the innovation, government budgets, annual reports, policy documents, legislation, reports on socio-economic developments, newspapers and chamber documents. During the interviews, questions were posed on (amongst others) the impact of parameters (e.g. a certain media attention to the innovation) on the dynamics within the subsystem and innovation process. The data has been structured along framework parameters.

- *Social capital variables* (section c in figure 5). Data on the social capital variables have been gathered through *desk research on the actor profile, assessment of the presence and strength of ties and interviews*. The professional profile of actors has been studied by using (online or offline) curricula vitae. The presence and strength of ties was assessed at the start of each interview while using a map depicting all relevant actors involved in the various stages of the innovation. The interviewees were asked if all relevant actors were covered by the map (if not, new actors were added), whom he or she knew in each innovation stage and how strong the relationship was with the persons he or she knew (weak, medium or strong tie). The distinction between weak, medium and strong tie was based on indicators such as amount of time spent together and emotional involvement (for a full overview of the indicators see interview format in Appendices). In addition, the interviewees were asked for each person they knew what level of trust (low, medium or high) they had in the other. The distinction between low, medium and high level of trust was based on indicators such as expected opportunistic behaviour, reciprocity and interdependencies (see Appendices). During the interviews, questions were posed on (amongst others) the impact of social capital variables on the innovation process.

In each case study, the data collection commenced with desk and internet research, after which research gaps were identified and filled with information generated by the interviews and tie assessment. The data-gathering process had a *second iteration round* in the sense that – based on the first-draft case description (which resulted from the first round of desk research, interviews and tie assessment) – a second round of data collection took place (through desk research, interviews and tie assessment). Furthermore, for each case study the chain of evidence was identified and key informants reviewed the draft description of the innovation process. The evidence has been structured and confronted with the propositions as defined in chapter 2. All case studies have been carried out in the same way (replication logic), using the same theoretical lens, case-study protocol, questionnaires and method to assess actors and relationships. The data derived from the case studies were collected in a case-study database.

In order to ensure the validity of the research, a *pilot case study* has been conducted and used to reveal inadequacies of the initial research design. The Dutch eIDM system was chosen as the pilot case and carried out before the other cases studies started. The pilot case has been methodologically evaluated. The main conclusion of the evaluation was that the methods chosen yield sound data for testing the theoretical propositions. However, to further increase the solidity of the methodology some alterations have been made. Firstly, as the sensitivity of the subjects discussed during the interviews was high (e.g. level of trust in others), and hence some actors were reluctant to participate in the research, it was decided to make the interview reports confidential and not to publish names of respondents in the thesis. Secondly, the pilot case study showed that the tie assessment – which initially was conducted by using a closed questionnaire – appeared to be a complicated exercise that could be best conducted while using

a map depicting all actors. The reason for this was that the a map provides the respondent with a structured overview of key actors involved in each innovation stage, which decreases the chance that actors and/or ties will be neglected. Thirdly, changes have been made to the interview format as certain questions on the interrelations between factors of the Advocacy Coalition Framework and the social capital variables appeared to be missing.

The data resulting from the desk research, tie assessment and interviews have been analysed along the three key data elements (see previous section, figure 7); (a) general information on the innovation process, (b) parameters and events of the Advocacy Coalition Framework and their manifestation, and (c) social capital variables and their manifestation. An assessment was made for each of the cases to establish whether the theoretical propositions (see section 2.7) were endorsed or rejected by the case studies. Subsequently, a cross-case-study analysis of the endorsement or rejection of propositions was conducted and conclusions have been drawn for each of the propositions. Rival propositions have been tested with the empirical data in order to assess if there are alternative explanations (not captured by the conceptual framework used) for the occurrence of the joined-up ICT innovations. Finally, the most significant findings have been addressed and key conclusions have been drawn. To increase the added value of the research findings, further reflection was given to the applied model, and future research challenges and policy recommendations were defined.

4.6 CASE FORMAT

In the next chapters, five to eight, the four cases selected (Austria, Belgium, Finland and Malta) are described by way of the following case format:

- *Introduction*. Cases start with an introduction to the specific eIDM innovation. This section provides general information on the innovation process, output and impact. The data is structured along the four innovation stages; the initiation, development, implementation and diffusion phase.
- *Advocacy Coalition Framework parameters and events*. Next, the relative stable parameters (e.g. attributes of the eIDM system, distribution of resources, cultural values and social structure) and external events (e.g. changes in socio-economic conditions, changes in public opinion and governing coalitions) are outlined.
- *Social capital variables*. The third section of each chapter describes, for each of the innovation stages, the network characteristics (network closure, strength of ties, heterogeneity of the network, broker's position and interpersonal trust) and subsequent network dynamics.
- *Overall conclusions*. The final section of the empirical chapters will draw overall conclusions about the influence of the parameters, events and social capital variables on the innovation process.

5

The Austrian Bürgerkarte

The first case of a joint development of an eIDM system by several Austrian government agencies will be described in this fifth chapter. As mentioned in the last section of the previous chapter, the empirical chapters consist of four main parts. In the introductory section, the innovation process is chronologically described along the innovation stages (initiation, development, implementation and diffusion). Conclusions are drawn about the application of strategies, decision making and the outcome and impact of the innovation. The second section will present evidence found regarding the impact of Advocacy Coalition Framework parameters and events. Each sub-section draws a conclusion about the specific effects of the variable. The influence of social capital variables is explored in the third section. For the five dominant network and tie characteristics (network closure, strength of ties, heterogeneity, broker's position and levels of trust) an overview is provided of the perceived impact by involved actors. The sub-sections of this third section conclude with an overview of the key impacts of the specific variable. The fourth (and final) section draws conclusions about the influence of the framework variables.[56]

5.1 INTRODUCTION

This first section describes the successive innovation stages of the Bürgerkarte development. For each innovation stage (initiation, development, implementation and diffusion), the most important actors involved, strategies applied and decisions made are outlined. The last part of this section provides a summary of the key actors, strategies and decisions and provides insight into the outputs and impacts of the innovation process.

5.1.1 Initiation phase

The strategic decision to implement e-Government services in Austria dates back to the mid-1990s.[57] In 1995, Austria launched an Information Society initiative. A

56 All websites mentioned in this chapter have been accessed between September and December 2009.

57 http://www.zenc.nl/uploads/29/54/2954d277fd8e53ab168d1ae55d8c85a2/egovernment_in_austria.pdf

year later, the federal 'Information Society Report; an Austrian Strategy and Action Plan' was published. The publication was followed by a general agenda under the name Information Society Action Plan that was coordinated by the Federal Chancellery. In 1999, the e-Europe initiative of the European Commission put the Information Society high on the Austrian political agenda. In the same year the e-Signature Act was prepared, and in spring 2000 the e-Europe initiative led to an initiative called 'e-Austria in e-Europe'.[58] The idea for the Bürgerkarte was conceived in those years, during which the Austrian information society was highly promoted by the Austrian government. One of the interviewees stated about the onset of the Bürgerkarte: 'The very first idea to develop an eIDM system for government services came up around 1999. Reinhard Posch, university professor at the Graz University of Technology, had been involved in the writing of the e-Signature directive at the European level and was also an advisor of the Hauptverband [Austrian Social Security Agency]. The paper-based social security identification system had to be replaced by a smart-card, and the idea was to incorporate the Bürgerkarte into this new card, which would grant access to all government services.'

In 1999, the Austrian Secure Information Technology Centre (A-SIT) was founded by the Austrian Ministry of Finance, the Austrian National Bank and the Graz University of Technology.[59] One of the main reasons to institute A-SIT was the European e-Signature directive, which demanded the establishing of a national Confirmation Body.[60] A-SIT was chaired by top officials of the three founding organisations; Arthur Winter, Andreas Ittner and Isidor Kamrat; scientific director of A-SIT was professor Posch.[61] On 20 November 1999, the Austrian government officially decided to use smart-card technology in order to simplify administrative processes for citizens.[62,63] In 2000, the federal Ministry for Public Service and Sports (BMÖLS) set up the Task Force e-Austria, existing of leading experts, to implement the 'e-Austria in e-Europe' project.[64,65] The objectives of the task force were to advance the use of ICT in government and public administration and to coordinate the implementation of the e-Europe actions.[66] Professor Posch was in charge of e-Government in the task force.[67] Significant e-Government projects identified by the task force were the development of the one-stop service portal www.help.gv.at and the development of an eIDM system.[68]

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58 http://is.jrc.ec.europa.eu/pages/ISG/documents/Austria_000.pdf
59 Frauenhofen, (2006), 'Study PKI and Certificate Use in Europe', Brussels. http://www.jipdec.or.jp/archives/ecom/report/Study_on_PKI_2006_in_EUROPE-FINAL.pdf
60 http://www.a-sit.at/pdfs/About_ASIT_2009_en_MH.pdf
61 http://www.a-sit.at/de/allgemein/asit_organigramm.php
62 http://www.acsac.org/2002/papers/22.pdf
63 The Cabinet Council decided to enhance the health-insurance card with electronic signatures.
64 http://www.eipa.eu/files/repository/eipascope/scop2001_Special_ENGLISH.pdf
65 See also http://www.austria.gv.at/site/6507/default.aspx
66 http://www.sibis-eu.org/files/D4-2_Annex.pdf
67 http://ec.europa.eu/information_society/activities/foi/library/epr.pdf
68 http://www.sibis-eu.org/files/D4-2_Annex.pdf

One of Task Force e-Austria's key recommendations was to institute an Information and Communication Technologies (ICT) Board, which would be responsible for the coordination, planning and implementation of e-Government solutions between the federal government, the provinces and local authorities.[69] This board was established in June 2001,[70] and the members of the ICT Board consisted of the chief information officers (CIOs) of the ministries, who were nominated by their respective ministers. The ICT Board was headed up by the federal Chief Information Officer (IT-Koordination des Bundes), Reinhard Posch, who was nominated by the federal government.[71] Working groups were formed to provide advice and assistance to ministries, provinces, cities and local authorities. One of those working groups handled the development of an eIDM system for government services to citizens. The initial idea within the eIDM working group was to use the e-Card of the Austrian Social Security Agency as a Bürgerkarte. The paper-based social security identification system would be replaced by a smart card (the e-Card), which, according to involved actors, provided the opportunity to integrate and launch the Bürgerkarte.

5.1.2 Development phase

Several respondents reported that there were important problems in the e-Card project, the difficulties of which also hampered the development of the Bürgerkarte. For example, one of the interviewees stated: 'At the Hauptverband [Social Security Agency], the first procurement round [of the e-Card] failed for some reason. In addition, there was fierce resistance from the Chamber of Doctors. By introducing the new card, their actions would become more transparent. The new card would, for instance, register the number of patients a general practitioner would see in one hour. While the Hauptverband was struggling with their project to replace the paper-based identification system by a smart card, the idea of a general Bürgerkarte for all government interactions gained importance at the federal level. Reinhard Posch became federal CIO and the idea came up to make the Bürgerkarte solution card-independent and thus also independent from the implementation of the Hauptverband card. Hence, the Bürgerkarte project would not suffer from the lack of progress being made in the Hauptverband project.'

In 2000, the federal Ministry for Public Service and Sports (BMÖLS) together with A-SIT published the first version of the Bürgerkarte white paper.[72] The idea of an open Bürgerkarte concept was laid down in the white paper as follows:[73] 'Das Konzept Bürgerkarte beschreibt keine physische Karte, sondern definiert nur jene Rahmenbedingungen, die notwendig sind, um einen Signatur Token im e-Government einsetzen zu können. Damit ist die Teilnahme am „Konzept Bürgerkarte"

69 http://www.digitales.oesterreich.gv.at/site/6507/default.aspx
70 http://ec.europa.eu/idabc/servlets/Doc?id=1305
71 http://ec.europa.eu/information_society/activities/foi/library/epr.pdf
72 http://www.buergerkarte.at/regain/file/D:/webs/at.buergerkarte.downloads/Weissbuch-Buergerkarte.20020515.pdf?index=main
73 http://www.swe.uni-linz.ac.at/teaching/lva/ss04/projektstudium/prost246.556/Literatur-Linz/Posch%202002.pdf

allen offen. Bereits jetzt ist absehbar, dass der Bürger unter mehreren Angeboten an Chipkarten wählen können wird. Interessensvertretungen, Kammern und privatwirtschaftliche Unternehmen planen bereits die Ausgabe von Chipkarten, die dem Konzept Bürgerkarte entsprechen.'

In 2001,[74] the ICT Strategy Unit was established (Stabsstelle IKT-Strategie),[75] which was headed by the federal CIO Reinhard Posch and fell under the direct responsibility of Minister Susanne Riess-Passer[76] of BMÖLS, and from 2002 (after the elections) directly under the Federal Chancellor Wolfgang Schüssel.[77] The ICT Strategy Unit existed of three sub-units: a technical unit that developed applications, a public relations unit responsible for the marketing of the applications and an administrative unit that dealt with internal procedures. Several respondents pointed to the ICT Strategy Unit's independent position. One of them, for instance, stated: 'We had a special position; did not have to answer to any of the top officials, only to professor Posch and the chancellor. We did not even reside in the Chancellery; we worked at a Regus office – some building where businesses can rent rooms.' In 2001 and 2002, the ICT Strategy Unit developed the PKI infrastructure for the Bürgerkarte.

The provision of certificates was mandated to a company called A-Trust in 2002, which is a shared-service provider consisting of several Austrian banks and companies and thus far the only accredited and certified trust centre in Austria, according to the 1999 signature law and the European e-Signature Directive 1999/93/EG (EU 1999).[78] The inspection of Bürgerkarte certificates, signature-creation devices and underlying infrastructure was mandated to A-SIT.[79] In 2002, the Austrian government also established the Central Residents Register (CRR).[80] Every person residing in Austria is registered in the Central Residents Register and is assigned a unique personal identification number (PIN), called a CRR number. Any person who does not fit in the register can be registered with the Supplementary Register

74 http://www.fidis.net/resources/deliverables/interoperability/int-d42000/doc/7/

75 ftp://ftp.freenet.at/beh/buergerkarte-grundlagen.pdf

76 Suzanne Riess-Passer was minister of the Federal Ministry for Public Service and Sports from 2000 to 2002, during the first-term chancellery of Wolfgang Schüssel.

77 http://www.redactielab.nl/files/Beelden/DTP%20-%20PDF/KJD23-art%20Posch.pdf, Schüssel was Austrian Federal Chancellor from 4 February 2000 to 11 January 2007. See http://de.wikipedia.org/wiki/Wolfgang_Sch%C3%BCssel#Bundeskanzler_von_2000_bis_2007

78 http://www.a-trust.at/html/erstinfos.aspx?guid=433030075&extrag={26774648-30D7-4BD9-A75D-A283603566CF}#frage8: 'A-Trust ist ein österreichisches Trust Center, das technisch und organisatorisch voll den hohen Anforderungen des Signaturgesetzes entspricht. A-Trust kann sich daher auch "Akkreditierter Zertfizierungsdiensteanbieter" nennen und das Bundeswappen führen. […] Daneben bietet A-Trust eine volle Palette von einfachen Zertifikaten für den Einsatz abseits der qualifizierten digitalen Signatur laut Signaturgesetz an, z.B. Serverzertifikate und Amtssignaturzertifikate. Das Unternehmen A-Trust befindet sich im Besitz österreichischer Banken/Geldinstitute, Industrieunternehmen und Kammern.'

79 http://www.a-sit.at/pdfs/About_ASIT_2009_en_MH.pdf

80 http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VB3-4T0FF98-2&_user=603085&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1000783862&_rerunOrigin=google&_acct=C000031079&_version=1&_urlVersion=0&_userid=603085&md5=760f6e330ab3db93172ff6a6db3d9531

(SR) and receive a PIN. This PIN is one of the key identifiers used by the application of the Bürgerkarte concept.[81]

5.1.3 Implementation phase

The first pilot project with the Bürgerkarte concept was launched in 2002 by the Austrian Computer Society (Osterreichische Computergesellschaft).[82] Electronic ID cards were issued by the Austrian Computer Society from 24 February 2003 onwards, in cooperation with A-Trust and the ICT Strategy Unit of the Federal Chancellery.[83] Various respondents stated that the ICT Strategy Unit faced difficulties in finding an appropriate carrier (card) for the solution. One of them, for instance, reported: 'At that time, we [the ICT Strategy Unit] were desperately seeking a card that could accommodate the function of a Bürgerkarte. The Hauptverband's e-Card wasn't a success, and so we needed another opportunity to realise the Bürgerkarte concept.' Another interviewee reported: 'The Austrian Computer Society got involved because Mr. Posch chaired one of the working groups – the group about IT and security. We had some meetings about the Bürgerkarte concept. […] We organised a press conference to launch the new card with a Bürgerkarte function.'

Although there has not been an official evaluation of this first implementation of the Bürgerkarte, the interview reports reveal that the team involved in the implementation faced some substantial problems. One of the respondents explained: 'There were a lot of technical problems. The members of the society who wanted to activate the Bürgerkarte function found it very difficult to get the software running. Even the IT professionals had problems with it.' And another actor: 'The usability of the system was low back then. It was very complicated to install the card reader and even to purchase a card reader as there were only few companies which sold card readers. There were large thresholds for society members to use the Bürgerkarte concept.' And: 'People had to pay around 40 euros to obtain a certificate with which they could identify themselves. Of course no citizen was willing to pay these costs.'

In 2004, the MasterCard of several Austrian Banks and the student chip card of the Vienna University of Economics and Business were prepared for the Bürgerkarte.[84] In the same year, the Austrian Parliament passed e-Government legislation establishing a legal framework for the Bürgerkarte.[85] In 2005, a mobile application for citizen authentication was made available as well as the e-Card of the Social Security Agency, which included the option of activating the Bürgerkarte function.[86]

81 http://ec.europa.eu/idabc/en/document/4486/5584
82 http://www.rechtsprobleme.at/doks/burgerkarte-gerstbach.pdf
83 http://www.epractice.eu/en/news/284155
84 http://www.rechtsprobleme.at/doks/Bürgerkarte-gerstbach.pdf
85 Parycek et al. (2004).
86 'A1 Signatur: der Mobilfunkbetreiber Mobilkom Austria bietet mit der A1 Signatur einen serverbasierten Dienst für die Verwaltungssignatur an. Ander sals bei den kartenbasierten Lösungen wird bei der A1 Signatur nach dem Ausfüllen des Formulars ein nur einmal verwendbarer und zeitlich beschrankter SMS-Code an den Handybesitzer geschickt. Durch die

By the end of 2005, the contracts of the employees of the ICT Strategy Unit were terminated. The Federal Chancellor decided that it was no longer necessary to have a taskforce with a specific position since most of the development work had been carried out. It was decided to continue some of the work in a unit called Chief Information Office, which fell under the Federal Chancellery, to add some new tasks to this office and to mandate the technical work to a newly established unit of the Graz University of Technology, called EGIZ. The Chief Information Office focused on law, organisation, international relations and project management, while EGIZ handled the technical development of e-Government applications.[87] In autumn 2005, the ICT Board was replaced by the 'Digital Austria' platform, which also represented the counties and municipalities.[88] The main tasks of the platform were (and still are) strategic decision making, priority setting of common e-Government projects and the coordination, monitoring and communication of these activities.

5.1.4 Diffusion phase

Although the MasterCards of several banks, the e-Card, the Austrian Computer Society Member Card and the student chip card of the Vienna University of Economics and Business were prepared for the Bürgerkarte, in 2007 citizen enthusiasm for the concept was still far behind expectations. Despite the efforts to improve the usability of the software and making it freely available from 2004 onwards,[89] in March 2007, a mere 20,000 Bürgerkarten had been activated, whereas the government had planned for 50,000 by 2006.[90] Of the 8.2 million e-Cards that had been issued by October 2006, only 8,500 citizens used the opportunity to enhance their card with the Bürgerkarte signature, even though it was at no cost.[91]

In order to further stimulate the diffusion of the Bürgerkarte among citizens and service providers, the Federal Chancellery undertook several actions. In 2008, a large campaign was launched to encourage students to use their student ID cards as Bürgerkarte by giving them free card-readers. However, here too the acceptance rate was lukewarm, especially since many students were against the new e-Voting system, which they thought endangered their privacy. In 2008 and 2009, test trials for e-Voting for the Austrian Student's Association (Österreichische Hochschülerschaft (ÖH)) were introduced, which led to protests from the involved students.[92] Besides the e-Voting initiative, the Federal Chancellery undertook several other

korrekte Eingabe eines zusätzlichen PINs und dem SMS-Code wird die Signatur automatisch durchgefuhrt.'

87 http://www.redactielab.nl/files/Beelden/DTP%20-%20PDF/KJD23-art%20Posch.pdf

88 http://www.epractice.eu/en/document/288171

89 http://www.fidis.net/resources/deliverables/hightechid/int-d36000/doc/31/

90 http://www2.argedaten.at/php/cms_monitor.php?q=PUB-TEXT-ARGEDATEN&s=18047gle

91 http://www.jipdec.or.jp/archives/ecom/report/Study_on_PKI_2006_in_EUROPE-FINAL.pdf

92 Survey results are inconclusive. The ÖH committee was against e-Voting, the Austrian ministry speaks of a 82% approval rate for e-Voting among students, but surveys within the general public in 2007 and 2008 indicated a rejection of e-Voting. According to a 2008 survey, 60% or the surveyed population was negative about e-Voting (http://futurezone.orf.at/stories/277927/).

actions to spread word of the Bürgerkarte concept. They participated in e-Government conferences to explain and promote the Bürgerkarte among service providers. A-SIT published many flyers and instruction videos[93] on the Bürgerkarte.[94,95,96] In order to inform citizens, the Bürgerkarte website[97] was launched, containing information on how to obtain, activate and use the Bürgerkarte.

Since January 2008, the e-Card of the social security institutions has fully replaced – due to amendments[98] in the Austrian e-Government legislation – traditional signatures.[99] The amendments also provided a simplification of the issuance process of the Bürgerkarte. According to the new legislation, apart from issuance of a new Bürgerkarte by public authorities, other alternatives have been legally approved, such as issuance by the online services portal of the Austrian Fiscal Authority FinanzOnline[100] or by automated teller machines. In November 2008, the first version of the new online Bürgerkarte middleware MOCCA (Modular Open Bürgerkarte Architecture)[101] was released at the open-source platform www.egovlabs.gv.at.[102] One of the aims of using this new middleware was to lower user thresholds by making the software more user-friendly. MOCCA allows implementing Bürgerkarte-based authentication at websites without requiring the installation of software at the user's computer.[103]

Despite all those efforts, today the take-up by service providers and citizens is still disappointing. In November 2009, a mere 120,000 Bürgerkarte certificates had been issued and around 15 government services were available through the Bürgerkarte concept.[104] According to some interviewees, the marketing of the Bürgerkarte was not effective enough. One of them stated: 'Public administration is not well suited for marketing and campaigning products. It has always been difficult in terms of budgetary restrictions. Now and then we have an article or advertisement in the newspaper, but we cannot spend huge amounts.' According to others however, there are other explanations for the limited take-up: 'Although the software very much improved over time and card readers became more available – nowadays many laptops have a card reader integrated – the take-up still has been limited. […] There are several causes. An important one is the fact that the frequency of interaction between government and citizen is very low. Citizens

93 http://www.a-sit.at/de/dokumente_publikationen/videos/index.php
94 http://www.a-sit.at/de/dokumente_publikationen/flyer/index.php
95 http://www.a-sit.at/de/dokumente_publikationen/praesentationen/index.php
96 http://www.a-sit.at/pdfs/20051205_Leitold-ADV-24-Seiten.pdf, e.g. during the 2002 e-Government Conference in Vienna.
97 http://www.buergerkarte.at/en/index.html
98 http://www.digitales.oesterreich.gv.at/site/cob__27037/5236/default.aspx
99 http://www.epractice.eu/en/document/288173
100 https://www.bmf.gv.at/EGovernment/FinanzOnline/
101 MOCCA – 'Modular Open Bürgerkarte Architeture ist ein vom E-Government Innovationszentrum (EGIZ) gestartes Projekt zur Implementierung einer freien, modularen, open-source Bürgerkartenumgebung (BKU).'
102 http://www.epractice.eu/en/document/288168
103 http://www.egiz.gv.at/
104 See also European Commission, (2009), 'eID Interoperability for PEGS, Austrian Country Profile', Brussels.

have on average 1.2 yearly contact moments with government agencies. For many citizens this is too low to make the effort to activate the Bürgerkarte.'

The future diffusion of the Bürgerkarte concept is coordinated by the Chief Information Office of the Federal Chancellery, which is also responsible for the maintenance and further development of the Bürgerkarte concept.[105] In the coming years, the Chief Information Office will intensify their focus on promoting the Bürgerkarte. More services will be offered, which the office expects to stimulate citizens to activate the Bürgerkarte function. Another major priority is the participation of the Austrian government in European projects such as STROK. One of the involved actors stated in this respect: 'Now that the mobile signature has become available, we expect a further take-up by citizens. The fact that technology – such as card readers – is more mature and widely available will also stimulate take-up. In addition we expect the first cross-border services to be available by using the Bürgerkarte by the end of next year.'

5.1.5 Conclusions

As the previous sections have demonstrated, the dominant actors in the Bürgerkarte project were the ICT Strategy Unit of the Federal Chancellery (responsible for the project), A-SIT (inspection and approval of Bürgerkarte certificates) and A-Trust (provider of Bürgerkarte certificates). Other actors involved were service providers and organisations that produce or issue eIDM carriers (such as the Social Security Agency, which provides the e-Card). The principal strategy of the ICT Strategy Unit was to develop an 'open' eIDM concept; a solution which can be applied to various eIDM carriers (such as smart cards and mobile phones). The decision to make the Bürgerkarte an open concept was largely caused by the difficulties in the e-Card project of the Social Security Agency, whose card was initially the sole carrier of the Bürgerkarte. As the Federal Chancellery feared a lack of progress in the e-Card project, it decided to make the Bürgerkarte carrier-independent.

Furthermore, the ICT Strategy Unit's approach appeared to be highly technology driven. A dominant feature in the innovation process of the Bürgerkarte concept was the technical design of the solution. The technological ambitions of the ICT Strategy Unit – responsible for the development of the Bürgerkarte – were high compared to the eIDM ambitions of other European member states. In later stages of the innovation, more attention was paid to the usability and the marketing of the Bürgerkarte. The ICT Strategy Unit also decided to change the financing model and decrease the costs for citizens of obtaining the Bürgerkarte function. In the past few years, the focus has shifted towards the extension of the number of electronic services available through the Bürgerkarte. In June 2009, the

105 http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VB3-4T0FF98-2&_user=603085&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1090110470&_rerunOrigin=google&_acct=C000031079&_version=1&_urlVersion=0&_userid=603085&md5=b345d0ab93053ea6e50118980b670861

Bürgerkarte could be used[106] for around 15 electronic government services, and in November 2009 around 120,000 Bürgerkarte certificates had been issued (approximately 1.5% of the Austrian population). Whereas the outcome of the innovation process is a highly mature eIDM system, the impact has been limited due to the small number of services available, a small user base and limited use by the citizens who have a Bürgerkarte.

5.2 PARAMETERS AND EVENTS OF THE ADVOCACY COALITION FRAMEWORK

The influence of the Advocacy Coalition Framework parameters and events are explored in this section. An assessment is made for each parameter and event to discover whether and how the parameter or event affected the joint innovation process.

5.2.1 Attributes of the good

The Bürgerkarte was developed to enable citizens to securely access electronic public services and to electronically sign formal documents.[107] Key in the Austrian eID concept is that there is not just one single type of card which can be used as a Bürgerkarte.[108] Basically, any card supporting secure electronic signature technology that can store personal data is suitable as a Bürgerkarte (e.g. student chip card, bank cards, national health insurance e-Card). The concept also applies to mobile phones. Thus, multiple cards (and mobile phones) issued (or sold) by different entities can include the Bürgerkarte function.

Irrespective of the carrier used (chip card, mobile phone or USB equipment), the chosen medium has to meet certain security requirements as defined in the Bürgerkarte policy.[109] For example, the carrier has to support qualified signature, certain identification technology and enable data storage. A personal identifier, called the 'source PIN', is stored on the card. This source PIN is derived from the person's unique identification number (ZMR number as stored in the Central Register of Residents) and serves as the basis for generating sector-specific personal identifiers. A person's source PIN can be controlled only by the legitimate holder of the Bürgerkarte, and cannot be stored directly in applications. To enhance data protection, both the ZMR number in the source PIN and derivation of the sector-specific personal identifier from the source PIN are encrypted.

106 See also European Commission, (2009), 'eID Interoperability for PEGS, Austrian Country Profile', Brussels.
107 http://www.epractice.eu/en/document/288173
108 http://www.epractice.eu/en/document/288173
109 http://ec.europa.eu/idabc/servlets/Doc?id=32296

All citizens aged 18 years and older who reside in Austria and are listed in the Central Register of Residents are entitled to a Bürgerkarte.[110] Possessors of a Bürgerkarte-prepared card (such as a health insurance card or bank card), can activate the Bürgerkarte function. If a citizen does not have a prepared card, he or she can purchase a qualified signature, which can be used as a Bürgerkarte, at the certification service provider A-Trust. The activation process depends on the actual token used:

- Bank cards require the activation of a qualified certificate. A request for the certificate can be made on the internet. Registration requires physical presence at a registration office (banks, notaries) and identification by means of a photo ID.
- The health insurance card (e-Card) can be activated at a registration office (social insurance organisation) where the applicant has to be physically present and identify him/herself by means of a photo ID. Activation can also occur on the internet, but then the user needs a registered letter, which he or she can obtain at a post office while identifying him/herself by means of a photo ID.
- To register a mobile phone as a Bürgerkarte, the application is made via the internet. Registration requires physical presence at a registration office of the mobile phone service provider and identification by means of a photo ID.

The interviews reveal that some attributes of the Bürgerkarte solutions have impacted the dynamics in the subsystem and/or the innovation outcome. Firstly, various respondents argued that the fact that the Bürgerkarte is an *open concept* has impacted the number of card providers involved in the development phase. Instead of one, there are up to ten card providers in Austria that have incorporated the Bürgerkarte function into their card (e.g. Social Security Agency, banks, universities, Austrian Computer Society). One of the respondents, for instance, said about this: 'When we saw that the e-Card project of the Hauptverband [Social Security Agency] did not make any progress, we decide that it would be best if the Bürgerkarte concept would be open; that it could be applied to any card. As a result, the number of potential carriers of the Bürgerkarte increased substantially. […] Compared to other eIDM solutions in European member states, the involvement of so many card providers is quite unique.'

Secondly, several interviewees stated that the *complexity of the identification scheme and subsequent implementation* was one of the reasons why service providers were reluctant to join up. One of them, for instance, explained: 'At a certain point in time, there was a study which indicated that the average number of yearly interactions between citizen and local government was 1.2. […]. This, combined with the burden to implement the system, resulted in a limited willingness of the regions and municipalities to implement the system.' Another actor involved: 'The regions and the municipalities find the use of the source PIN and sector specific numbers inefficient. For them it is very complicated to implement this system.

110 https://www.eid-stork.eu/index.php?option=com_processes&act=show_process&Itemid=60&id=312

Today, the large majority has not implemented it yet.' And: 'We had discussions with local service providers who do not understand why we developed this kind of scheme. […] We have to convince them that there is a need for it. They say that they already have a register that contains citizens' data. We try to convince them that on a large scale it makes sense: it enhances data protection.'

Thirdly, the cumbersome *(re)activation procedures of the Bürgerkarte function* are generally perceived by involved actors as hindrances for user adoption: 'Although the software very much improved over time and card readers became more available – nowadays many laptops have a card reader integrated – the take-up still has been limited. […] There are several causes. One is the fact that the Bürgerkarte is not only an identification system, but also an e-Signature system. Until 2008, it was stated in the Signature Act that in case of loss of the code, one had to activate it again in person. In other words: the code could not be sent by email. In addition, the average number of e-Goverment transactions per citizen on a yearly basis is very low. People easily forget their code and the efforts to reactivate it are too high in relation to the frequency of use. The Bürgerkarte is a brilliant concept, but too complicated.'

In conclusion, it seems that, on the one hand, the open technical concept of the Bürgerkarte solution increased the number of card providers involved, but, on the other hand, that the complexity of the implementation and (re)activation resulted in limited adoption by service providers and citizens.

5.2.2 Basic distribution of resources

Since the annual reports of the Federal Chancellery, the Social Security Agency, A-Trust and A-Sit are not open to the public, it is difficult to estimate the costs of the Bürgerkarte concept. Yet, interviews and articles in newspapers reveal the following budgets and costs for citizens:

- On the government side, budgets were available at the Federal Chancellery to establish the ICT Strategy Unit and at Hauptverband to create the new national health insurance card. One of the interviewees said the following about the budget of the Federal Chancellery: 'We had a budget for around 25 employees and a few million euros to develop the Bürgerkarte Strategy.' Another respondent: 'There is a budget at the Federal Chancellery for people working on e-Government and a low budget for the procurement of expertise.' About the national health insurance card it was stated that: 'The production of the e-Card cost about 100 million euros.'
- Several respondents stated that the investments made by A-Trust amounted to about 25 million euros, the costs of which comprised budgets for the establishing of the certification organisation.
- The federal Ministry of Science and Research invested 900,000 euros in the e-Voting project. The card readers provided to students cost around 100,000 euros, personnel expenses around 88,000 euros, the software for the e-Voting platform around 66,000 euros, the certification around 54,000 euros,

15,000 for the voting website, 74,000 for a study on the e-Voting project and 50,000 for the evaluation of the e-Voting project.[111]

- The interviews reveal that the software to implement the Bürgerkarte system into the systems of the service providers was provided to them free of charge. However, they did not receive any financial support for the integration of the software into their systems.
- In the early years of the Bürgerkarte innovation, the cost for the citizens to obtain a Bürgerkarte function, certificate and accompanying devices was around 100 euros. Die Presse calculated in February 2002 that 'A signature card costs about 60 euros (826 S), and the digital signature is valid for one year. Extending the period of validity by one more year costs 15 euros. The cost for card readers starts at 33 euros.'[112]

The distribution of resources has impacted the dynamics in the subsystem in several ways. Firstly, many respondents stated that there have been recurrent discussions between the Federal Chancellery, A-Trust and the banks on the financing model of the Bürgerkarte. One of the interviewees, for instance, explained: 'We have had many talks with the banks and A-Trust about the Bürgerkarte. Back in 2000, the business case for them was to gain money by selling Bürgerkarte certificates to citizens [by A-Trust]. However, citizens were not willing to pay and the take-up was low.' Another respondent: 'The idea of the banks was that the Bürgerkarte solution would help them to make internet payments more secure. However, they concluded that – compared to the phishing problem – internet fraud was only a minor problem. Then the idea was that the banks could gain money through the purchase of the Bürgerkarte certificates by A-Trust. The banks invested around 25 million in A-Trust. The take-up lagged behind and the willingness of banks to be involved decreased.'

Secondly, various respondents argued that the costs of the Bürgerkarte for citizens, in combination with the disappointing take-up by citizens, led to many discussions between involved parties. In 2005, a new cost structure was agreed upon. One of the actors involved, for instance, reported: 'It took several long disputes but eventually the discussion was settled. The financial construction would be managed by the chancellery and various players, such as the Hauptverband [Social Security Agency], the Federal Chancellery and the Ministry of Finance would be part of the deal. […]. Eventually they all agreed that they had to find another financing model for the Bürgerkarte in order to decrease the costs for citizens. After many discussions, the idea was that every Austrian citizen would pay a certain amount for the e-Card and that 10 euros of this amount would be used to make the Bürgerkarte chip on the e-Card and to provide citizens with certificates.'

Thirdly, several interview reports reveal that the lack of financial resources to implement the system at the local level prevent local authorities from participating. One of the involved persons, for instance, stated: 'The municipalities and regions

111 http://diepresse.com/home/bildung/universitaet/504293/index.do
112 Die Presse, 5 February 2002, 'Elektronische Signatur: Ab heute im Postamt erhältlich.'

could download technical specifications on a website, but the federal government did not offer any support for implementing the software into existing infrastructure. They got modules to prove citizens' identities, but nobody told them how to use the modules. They have to finance the implementation themselves, which is one of the central reasons why they are reluctant to join-up.'

In conclusion, the basic distribution of resources affected the dynamics in the subsystem in the sense that there were many negotiations between involved parties on the funding of the Bürgerkarte concept. In addition, the costs of the Bürgerkarte for service providers and citizens were perceived as being too high in relation to the benefits of the system, which made them reluctant to adopt the system.

5.2.3 Fundamental cultural values

Key fundamental values that contributed to the definition of eIDM issues in the subsystem and the shaping of the eIDM innovation can be found in leading policy documents on e-Government and eID. The most influential policy document is the 'Bürgerkarte White Paper', the first version of which was published in 2000 and the final version in 2002.[113] This document was jointly produced by BMÖLS and A-SIT, two dominant actors in the subsystem. This document stresses the achievement of several public values. Firstly, the authors of the white paper perceive technology as an enabler *for improved services to citizens and businesses*. The document states that the Bürgerkarte concept is an enabler for the integration – and hence increased effectiveness – of separate e-Government initiatives: 'Aktivitäten der elektronischen Verwaltung entstehen nebeneinander und oft ohne enge Koordination. Das Konzept Bürgerkarte als ein zentrales Element des e-Government hat besonderen Bedarf, mit anderen Aktivitäten abgestimmt zu werden. Die elektronische Signatur erlaubt die wirksame Trennung der Bereiche Anwendung, Portal, Heranführung und Bürger, die ihrerseits eine wichtige Basis für weitere Veränderungen aufgrund von Technologieentwicklung ermöglicht.'

Furthermore, the white paper pays close attention to the *security of the solution*. In the introduction to the document, it is contended that the security of the Bürgerkarte concept is a fundamental requirement for both citizens and the government. In addition, it is stated (section 2.1.1) that the use of secure electronic signatures in communications with the administration is crucial and that the application of certain technologies – in particular asymmetric cryptography, hash procedures and certification – can provided the required security level: 'Der Einsatz sicherer elektronischer Signaturen in der Kommunikation mit der Verwaltung ist das Schlüsselelement für die Gewährleistung der Sicherheit im e-Government. […]. Dabei werden folgende Elemente notwendig: (1) Public-Key-Kryptographie, auch als asymmetrische Kryptographie bezeichnet, stellt die mathematische Grundlage dar, (2) Hash-Verfahren gewährleisten Integrität der Daten und erlauben einen effizienten Signaturerstellungsprozess (3) Zertifikate

113 http://www.buergerkarte.at/regain/file/D:/webs/at.buergerkarte.downloads/Weissbuch-Buergerkarte.20020515.pdf?index=main

binden die technischen Elemente wie kryptographische Schlüssel an die Identität des Signators.'

The third central element in the white paper is *technology*. Although most respondents consider the white paper's most important aim to convince top officials and policy makers of the need for the Bürgerkarte solution and its key features (such as the openness) the document is rather detailed on the technological design of the Bürgerkarte. Section 2.3 of the paper sets out the technical details of the solution and other sections also contain technical details. For instance, on the use of (international) technical standards: 'Die Schnittstelle des Security-Layer unterstützt die Erstellung sowie die Überprüfung von elektronischen Signaturen nach zwei gängigen international standardisierten Formaten: Cryptographic Message Syntax (CMS) und XML-Signature Syntax and Processing (XMLDSIG).' The technological orientation of the document may be caused by the fact that three of the five authors (including the first author, professor Posch) have a technical background (information processing and IT security).

Various interviewees have stated that in particular the technological orientation and the perception that security is one of the major concerns affected the innovation process and the outcome of the innovation. One of them, for instance, argued: 'Privacy and security are important values in Austria, and thus also in the group which developed the system. We [the ICT Strategy Unit] wanted to develop something which would be accepted by the Austrian citizens and created a highly secure system. As the technological experts were dominant in the unit, with Posch as the chief expert in information processing and IT security, the project also focused heavily on technologies.' And someone else: 'I guess the fact that key persons valued technology and security highly shaped the innovation to a large extent. We have a system which is highly secure and which consists of the newest technologies.' Others relate the technological orientation to the limited take-up of the Bürgerkarte: 'The Netherlands has their DigiD system, which makes use of a username, password and SMS authentication. Although DigiD is perceived as unsafe here [in Austria] compared to the Bürgerkarte, the take-up up is much higher. The advantage of DigiD is that it is easy to obtain, activate and use. It seems that there is a tension between highly secure and complex systems and usability and subsequent take-up.'

Overall, one can conclude that the technological orientation and privacy concerns have affected the features and subsequent impact of the innovation.

5.2.4 Basic legal structure

The main legal framework for the eID card consists of the following legislation:[114]

- The Electronic Signature Act, which came into force on 1 January 2000. The act legally recognises electronic signatures that meet certain security

114 https://www.eid-stork.eu/index.php?option=com_processes&act=show_process&Itemid=60&id=312

requirements and provides some evidence-based value to less secure electronic signatures. Furthermore, the law makes requirements of enterprises issuing qualified certificates and defines the conditions for the acceptance of certificates of foreign origin.

- The e-Government Act was enacted in 2004 and is the overall legal basis for Austrian e-Government. Regarding eIDM, the law defines the Bürgerkarte concept and its use in the public sector using sector-specific PINs and in the private sector using private sector-specific PINs. Important principles are: freedom of choice between means of communication; ensuring legal protection by creating appropriate technical means and unhindered access to information.
- The Source PIN Register Regulation was enacted on 2 March 2005. Part four deals with electronic representation. It defines the activities of the source PIN Register Authority that are necessary to implement the Bürgerkarte concept and the creation of the identity link or electronic representation.
- The Supplementary Register Regulation, August 2005, defines the operation of the Supplementary Registers as including natural or legal persons not covered by existing registers.
- The Federal Act on Registration of 1991, last amended in 2006; the law defines the Central Register of Residents.
- The Administrative Signature Regulation was enacted in April 2004 and stipulates that the technical requirements for the Bürgerkarte, in an interim period until end of 2007, need not be based on qualified signatures.

Amendments[115] in e-Government legislation in 2008 led to the adoption of e-Cards, issued from January 2008 onwards, which can be used as a fully fledged replacement of traditional signatures.[116] The same legislation amendments also provide simplification of the issuance process for the Bürgerkarte. Accordingly, apart from the issuance of the new Bürgerkarte by public authorities, other alternatives are now possible, such as issuance by the online services portal of the Austrian Fiscal Authority, FinanzOnline, or by automated teller machines.

Various interviewees stated that the strict requirements of the legal framework (e-Signature law, which changed in 2008) affected *the adoption of the innovation by citizens and businesses*. Until 2008, Austrian law required that citizens who had lost their code reactivate it in person, a requirement that has been generally perceived as a threshold for take-up by citizens. One of the respondents, for instance, stated: 'There are several causes [for the limited take-up by citizens]. One is the fact that the Bürgerkarte is not only an identification system, but also an e-Signature system. The e-Signature Act stated that in case of loss of the code, you have to activate it again in person. In other words: they cannot send it to you by e-mail.'

However, the interview reports of several respondents also show that legislation did not substantially affect the *dynamics within the subsystem or the innovation*

115 http://www.digitales.oesterreich.gv.at/site/cob__27037/5236/default.aspx
116 http://www.epractice.eu/en/document/288173

outcome. One of these respondents reported: 'At a certain point, we heard that a legal basis for the Bürgerkarte was needed. We wrote it in a few months. We had one legal specialist, and he was doing most of the work together with Reinhard Posch and another employee of the ICT Strategy Unit. It passed very smoothly in parliament.' Another actor involved stated: 'Of course there were some legal questions, for instance how to translate the legal requirements of the offline world into the digital world. This does not only concern communication with citizens and businesses, but also the internal administration of government bodies. For instance, there were questions on the authenticity of documents in electronic file systems. Most of these kinds of questions were solved quite easily.'

In conclusion, it appears that the strict requirements of the legal framework (in particular the e-Signature legislation) may have limited citizen take-up since the threshold for obtaining, activating and re-activating the Bürgerkarte was too cumbersome. However, there is not any sound evidence outlining the impact of the legal framework on interactions between actors of the subsystem or their strategies.

5.2.5 Changes in socio-economic conditions and technology

During the Bürgerkarte's innovation process, one of the most important changes in the socio-economic conditions of Austrian society was the burst of the internet bubble in 2001. In the years 1998, 1999 and 2000, the annual GDP growth in Austria was 3.6%, 3.3% and 3.7%[117] respectively (see figure 6 below). In 2001, 2002 and 2003, growth dropped to 0.5%, 1.6% and 0.8%. The Austrian economy recovered in the years 2004 to 2007 with respective growths of 2.5%, 2.5%, 3.5%, and 3.5%.

Figure 6. Austrian gross domestic product, 1980-2009

117 http://www.indexmundi.com/austria/gdp_real_growth_rate.html

A second socio-economic change during the innovation process was the evolution of technology applied in the Bürgerkarte solution. Whereas at the onset several of the technologies used for the Bürgerkarte development were relatively immature and had limited availability, today most of these technologies are widely used and mature. For instance, in the late 1990s, the costs of card readers were relatively high, they could only be purchased at a very limited number of companies and the software that supported the card readers suffered from teething problems.[118] Today, many companies sell card readers for much lower prices and their use has substantially increased.

A last major socio-economic change is the current economic crisis. Although the opinions of economists on the precise impact of the current economic crisis differ, no one would argue that we have not been in a global economic recession since 2008. In Austria, for example, GDP growth in 2008 was 2%, whereas in 2009 it was -3.8% (see figure 6 above).

Interviews reveal that there are differences in the perceived impacts regarding the influence of the economic and technological developments over time. Firstly, most respondents stated that the burst of the internet bubble at the beginning of the 21st century did not have a significant impact on the innovation process. These statements are endorsed by research carried out by the European Commission, which provided an overview of e-Government budgets in European countries in 2000, 2001 and 2002.[119] The study demonstrates that – despite the burst of the internet bubble – the e-Government budgets of the Austrian government increased between 2000 and 2002, from 760 million euros in 2000, to 785 million in 2001 and 812 million in 2002. In addition, interview reports reveal that – compared to other e-Government investments – the costs of the development and implementation of the Bürgerkarte was not perceived as being substantial. One of the interviewees for instance explained: 'The e-card would be rolled-out anyway and the extra money needed to add the Bürgerkarte function to the e-Card was relatively limited.'

Regarding the evolution of technology applied in the Bürgerkarte concept, several respondents stated that the ambitious technological targets the Austrian government set by applying smart-card technology and asymmetric encryption (elliptic cryptography) yielded a limited take-up by citizens since the technology was highly immature and therefore difficult to use. Some of them expect the take-up to increase now that the technology is more mature, easier to use and widely available (e.g. card readers). One of them stated: 'I think professor Posch is

118 This was not only the case in Austria, but also in other countries. See, for instance, Srivastava (2005).

119 European Commission, (2006), 'e-Government Economics Project (eGEP)', Expenditure Study Final Version, Brussels, http://82.187.13.175/eGEP/Static/Contents/final/D.1.3Expenditure_Study_final_version.pdf. The only publicly available data on public administration ICT and e-Government expenditure in Europe are those presented in the EITO (European Information Technology Observatory) 2002 edition, which contains a monographic section on e-Government.

a genius in technology, but he was too early. The technology was immature. It was not a case of plug and play when we started to implement the concept. Over time, the technology became more mature and this evolution of technology may boost the take-up.' However, there is no sound evidence at the moment that this take-up will take place the coming years.

Furthermore, several interviewees expect that the current economic crisis will have an impact on e-Government budgets since cutbacks are expected. According to one of the interviewees: 'The focus will continue to shift towards more efficiency and effectiveness as government budgets are likely to decrease in the coming years. This may impact the Bürgerkarte project in the sense that here too the focus will be on the concept's increased efficiency.' However, no sound conclusions can be drawn as regards the impact of the current economic crisis on the Bürgerkarte project.

To summarize, although respondents expect socio-economic conditions, such as the current economic crisis and the increased maturity of certain technologies, to impact the dynamics of the subsystem and/or the take-up of the innovation, currently there is no sound evidence of these impacts.

5.2.6 Changes in public opinion

Public opinion on the Bürgerkarte is most clearly voiced in the media, such as national newspapers. Over time, several newspapers have published articles on the Bürgerkarte project. The newspaper Die Presse[120] published over 70 articles mentioning the Bürgerkarte. In 2001, the majority of these newspaper articles concerned the introduction of the social security chip card (later on e-Card), the yearly costs of this card and privacy concerns related to the introduction of the Bürgerkarte. Die Presse, for instance, reported the following in November 2001: 'Eine Jahresgebühr von rund 500 Schilling (36,3 Euro) für die Sozialversicherungs-Chipkarte, die ab 2003 den Krankenschein ersetzen soll, hatte der Gesundheitssprecher Erwin Rasinger (VP) in der "Presse" gefordert. Dieser Vorschlag stößt auf Ablehnung in den übrigen Parteien […] Kritik äußert der Sozialsprecher auch daran, daß die Erweiterung der Chipkarte in Richtung "Bürgerkarte" geplant sei. Dabei könne es auch datenschutzrechtliche Probleme geben, meinte Öllinger.'

In 2002 the first articles emerged on the Bürgerkarte as e-Signature solution for digital interaction between government and citizen. Die Presse wrote (February 2002): 'Bereits möglich sind Gewerbeanmeldungen und Sozialversicherungsanträge via Internet. Die Datakom Austria, Tochter der Telekom Austria (TA), die die erste digitale Signatur am Markt bereitstellt, erwartet bis Jahresende etwa 50.000 verkaufte Zertifikate.' Newspapers also reported about difficulties in the procurement of the new social security chip card and the limited take-up of the Bürgerkarte 'Das Interesse an der im Vorjahr angekündigten Signatur ist noch ger-

120 http://diepresse.com/

ing, bestätigt Josef Ferstl, Geschäftsführer von A-Trust. […] Bisher konnten erst 10.000 Zertifikate über die Wirtschaftskammer in Umlauf gebracht werden.'

Several articles were published on the introduction of the online tax service in 2003, an application that did not make use of the Bürgerkarte solution. Die Presse wrote in January 2003: 'Februar 2003 wird es zudem möglich sein, Steuererklärungen an das Finanzamt zu übermitteln bzw. personenbezogene Grunddaten wie Adresse oder Bankverbindung zu ändern. Nach Angaben des Finanzministeriums braucht der Steuerzahler die Bürgerkarte dafür nicht.' Newspapers also wrote about the e-Voting pilot at the University of Vienna and the second procurement round for the social security chip card.

From 2004 on, the Bürgerkarte concept was increasingly criticized. Newspapers reported that the concept had failed to break through and published new expectations regarding its take-up. Die Presse, for instance, wrote in May 2004: 'Als Anbieter der Bürgerkarte werden ab dem Sommer auch die Banken fungieren. Zwischen 3,2 und 3,5 Millionen Bankomatkarten würden im Sommer turnusmäßig ausgetauscht, sagte dazu der E-Business-Leiter der BAWAG, Robert Krickl. Die neuen Karten seien dann mit Bürgerkarten-Funktion ausgestattet.'

Fewer articles were published in 2005 and 2006 about the Bürgerkarte. In 2007, 2008 and 2009, most of these articles concerned the e-Voting project, which led to protests among students as they found the process cumbersome and insufficiently secure. In addition, newspapers continued to write about the low take-up. In November 2009, Die Presse wrote: '[..] dabei nur wählen könne, wer über eine Bürgerkarte verfügt. Von denen seien aber allenfalls 100.000 im Umlauf.'

The majority of respondents stated that changes in public opinion did not have a substantial impact on the dynamics of the subsystem or the innovation strategy. One of them, for instance, stated: 'The student protest during the e-Voting project did not affect our work. There will always be some people who do not agree with the policy.' Another respondent: 'We did not really discuss the negative publicity on the e-Voting project in our team. But I regularly wondered why we did not send any counter messages. The system was easy to defend.' Another respondent: 'The discussions in the newspaper did not have a real impact. It did not change our strategy.' Someone else: 'There were not any press releases that had a real impact; there was no critical message with a real basis. We did not have to change. Public opinion is important but it is more a question of how to influence public opinion in such a way that take-up increases.'

On the other hand, most of the interviewed people were not satisfied with the extent to which the Federal Chancellery had tried to influence public opinion. One of them, for instance, stated: 'Public administration is not well suited for marketing and campaigning products. It has always been difficult in terms of budgetary restrictions. Now and then we have an article or advertisement in the newspaper, but we cannot spend a huge amount.'

Overall, no evidence has been found that the many articles on the Bürgerkarte concept and project in the newspapers (e.g. Die Presse) significantly affected the dynamics of the subsystem.

5.2.7 Systemic governing coalitions

There have been several changes to systemic governing coalitions in the Austrian Bürgerkarte case. Over time, the number of card and service providers grew, the national ICT platform changed names several times (e.g. Task Force eAustria, ICT Board and Digital Austria) and involved more members (today regions and municipalities are also represented). Yet, the core actors of the Bürgerkarte project remained relatively stable. Those responsible for the Bürgerkarte project from early 2000 up to today have been the federal CIO and his strategic team, the ICT Strategy Unit (nowadays called Chief Information Office). Other key actors, such as A-SIT and A-Trust, still have the same role (the inspection and issuing of certificates, respectively).

Although the federal CIO kept his position during this period of time, there were some changes within his strategic team. In June 2003, Christian Rupp, former e-Business representative of the Austrian Federal Economic Chamber, was appointed federal Executive Secretary for the e-Government initiative of the Austrian government, which also covered the Bürgerkarte project.[121] Rupp was appointed to directly report to the chancellor about the progress of the e-Government projects. In addition, in 2005 the contracts of the employees of the ICT Strategy Unit were terminated; several of them changed jobs and some new employees were hired. It was decided to continue some of the work in a unit called the Chief Information Office, which, unlike the former ICT Strategy Unit, was part of the hierarchy of the Federal Chancellery. The office received some new tasks, and the technical work was mandated to a newly established unit of the Graz University of Technology, called EGIZ. From 2005 on, the Chief Information Office focused on law, organisation, international relations, programme project management and ICT infrastructure, and EGIZ on the development of technical e-Government applications.[122]

The interviews reveal that the impact of new players was relatively limited. Firstly, although several interviewees suggested that the appointment of Rupp was an attempt to counterbalance the power of the federal CIO, most of them also stated that his appointment did not substantially affect the federal CIO's degree of influence. Secondly, the large majority of respondents stated that the termination of the contract of some employees of the ICT Strategy Unit and the new position of the unit in the hierarchy of the chancellery did not significantly affect the dynamics of the subsystem or the innovation outcome since the Bürgerkarte project had already progressed to such a degree (diffusion stage) that the role of the unit became less important. One of them, for instance, stated: 'From 2005 onwards

121 http://diepresse.com/home/wirtschaft/economist/207581/index.do?from=suche.intern.portal

122 http://www.redactielab.nl/files/Beelden/DTP%20-%20PDF/KJD23-art%20Posch.pdf

[the time that the taskforce ended], we only needed to further implement and disseminate the innovation. All important decisions had already been made, so we did not need the special position anymore, and neither did the change of employees have a significant effect.'

To summarize, although the composition of the unit's team members responsible for the Bürgerkarte changed several times during the project and the influence of the strategic unit decreased over time, these changes did not substantially impact the direction or outcome of the innovation.

5.2.8 Policy decisions and impacts from other subsystems

Over time, there have been three subsystems, the decisions, policies or strategies of which were related to the Bürgerkarte project, namely: the subsystem of local authorities, the (national) political subsystem and the European subsystem.

Firstly, as regards the subsystem of local authorities, the IT Cooperation Agreement (1998) between the federal state and regions was related to the Bürgerkarte project since the federal state and regions agreed on increased cooperation in e-Government projects.[123] It was stated in this agreement that: 'Der Bund und die Länder stellen bereinstimmend fest, daß zwischen ihnen im Bereich der Informationstechnologie (IT) eine verstärkte Kooperation erforderlich ist, um

- den steigenden Anforderungen an die Öffentliche Verwaltung bei der Informationsverarbeitung gerecht zu werden und
- sich bei unterschiedlichen IT-Verfahren dem Bürger und der Wirtschaft gegenüber einheitlich zu präsentieren.

Damit soll die bereits in weiten Bereichen positive Zusammenarbeit zwischen den IT-Verantwortlichen des Bundes und der Länder nicht nur fortgeführt, sondern vertieft und konkretisiert werden.' The areas in which the parties would cooperate were amongst others: standardisation, government intranet and application of web technology. Although not explicitly mentioned, the Bürgerkarte project can be understood as one of the means for applying web technology.

Secondly, there were issues raised by the subsystem of (national) political parties related to the Bürgerkarte project. From 1995 to 1999, the SPÖ ('Socialists') and ÖVP ('Conservatives') were in power during the initial drafting phase of the Bürgerkarte concept. From 1999 to 2006, the ÖVP and FPÖ ('Liberals') were in power, and the ÖVP and SPÖ were in power from 2006 onwards. Throughout the process, the ÖVP has always been the biggest promoter of the Bürgerkarte and e-Government. Even though the FPÖ is currently very critical about the Bürgerkarte, especially with respect to privacy protection (and against assigning every citizen a life-long ID number), it did not oppose it during the initial phase. In the mid-2000s, the SPÖ also expressed concerns about the Bürgerkarte, mainly focusing on the high costs, but the SPÖ finally voted together with the ÖVP in favour of the con-

123 http://reference.e-Government.gv.at/uploads/media/IT-Koop--Bund-Laender.html

cept. The only (major) party that was constantly sceptical about the Bürgerkarte, was the Green Party, which was opposed to it throughout the whole process.

The third relevant subsystem is the European Commission. The Commission has been engaged in eIDM issues since the late 1990s. The Information Society and Media department has an e-Government unit, whose name changed in 2007 to 'ICT for government and Public Services'. The unit regularly organises meetings with the e-Government subgroup, in which all member states are represented. In addition, the unit established expert groups, one of which focuses on eIDM. At the European level, there were several EU projects and directives on eIDM systems. In 1999, the European directive on electronic signatures went into force.[124] The directive laid down the criteria for legal recognition of electronic signatures in European member states. In 2004 and 2005, the European MODINIS project aimed, among other things, at assessing the states quo of eID systems in European member states and the exploration of possible European eID systems.[125] In 2005 IDABC launched the eID Interoperability for PEGS programme, the objective of which was to analyse the eID and authentication interoperability requirements.[126] In 2008 the STORK project was launched, which aims to establish a European eID Interoperability Platform that will allow citizens to establish new e-relations across borders by presenting their national eID.[127] In addition, Cap Gemini publishes an annual benchmark on e-Government progress in the European Union member states.

The interview reports show that the three different subsystems yielded different levels of impact. According to the majority of respondents, the impact of the local entities on the dynamics within the subsystem has not been substantial. One of them, for instance, states: 'The cooperation between the regions and municipalities was quite good actually. However, there was not much cooperation between the local and the federal levels in the Bürgerkarte project.' Another interviewee stated: 'The regions and municipalities have not been involved in the conception phase of the innovation. They became involved in 2004 in the e-Government board, but then the Bürgerkarte project was already in the implementation phase. I think that this is one of the reasons for the low take-up by regions and municipalities; they were not involved in the early discussions of the specifications and requirements of the Bürgerkarte. Now they are not interested; it is not their project. Using the Bürgerkarte concept yields no benefits for the regions and municipalities.'

In addition, most of the respondents stated that politics (e.g. chamber questions) did not significantly affect the dynamics of the subsystem. One of them, for instance, explained: 'Yes, of course there were chamber questions and political fuss about the Bürgerkarte project. But it did not have a real impact. There were some privacy issues and there was the student protest. But these incidents did not cause any discussions within our team. The expertise was in our unit and we knew that

124 http://europa.eu/legislation_summaries/information_society/l24118_en.htm
125 http://ec.europa.eu/information_society/eeurope/2005/all_about/modinis/index_en.htm
126 http://ec.europa.eu/idabc/en/document/6484
127 https://www.eid-stork.eu/index.php?option=com_frontpage&Itemid=1

what we were doing was right. The Bürgerkarte concept is very secure.' However, some report that the e-Government push by Federal Chancellor Schüssel created all kinds of opportunities within the subsystem to develop and implement the innovation. One of them, for instance, stated: 'e-Government was very high on Schüssel's political agenda. He was a strong driver behind the Bürgerkarte. It was thanks to Schüssel that there was a federal CIO, the ICT board and the ICT Strategy Unit.'

Furthermore, according to several respondents, actions within the European subsystem have affected the dynamics of the Bürgerkarte subsystem. One of the involved persons stated: 'Professor Posch was heavily involved in the writing of the electronic signature directive, and later on he became chair of the expert group of the European Commission on eIDM systems. He and his university department are also involved in all kinds of other projects, such as STORK. Posch's involvement definitely impacted the Bürgerkarte innovation. Our system is fully in line with the European requirements, and we will be among the first countries whose eID system can be used abroad.' According to several respondents, the Capgemini benchmarks also had an impact: 'In 2001 or 2002 we were ranked about 13th. This really bothered Schüssel. He said that he wanted to be in the top three within two years. This really gave a boost to the e-Government projects, including the Bürgerkarte project.'

In conclusion, it appears that the strong involvement of the federal CIO in European projects has influenced the dynamics of the subsystem and the outcome of the innovation. From the onset, the European e-Signature directive was a leading factor in the subsystem for the Austrian eIDM concept.

5.2.9 Conclusions

Regarding the parameters of the Advocacy Coalition Framework, it appears that the dynamics of the subsystem, the innovation process and the take-up of the innovation have been affected by the following parameters and events:

- The *attributes of the Bürgerkarte concept* affected the number of card providers involved in the innovation. In addition, the complexity of the identification scheme and the cumbersome (re)activation process resulted in its limited adoption by service providers and citizens.
- *Inadequacies in the financial model*, which were caused by flaws in the dissemination model (limited take-up by service providers and end-users), impacted the dynamics of the subsystem in the sense that it led to much negotiation between involved parties and eventually to new funding and cost models.
- The importance attributed by developers of the Bürgerkarte solution to *values such as security and the use of advanced technology* impacted the features of the innovation and resulted in limited take-up – and thus impact – of the innovation.
- The basic *legal structure* did not substantially affect the dynamics of the subsystem, but did affect the innovation impact.

- There is no sound evidence that the *changes in socio-economic conditions and technology* affected the dynamics of the subsystem.
- There is no evidence that the *many articles about the Bürgerkarte* concept and project in the newspapers (e.g. Die Presse) significantly affected the dynamics of the subsystem, innovation output or impact.
- The *governing coalitions* did not substantially change over time. The changes in the CIO's strategic team, and the changed position of the strategic team, did not have a substantial impact on the dynamics of the subsystem or innovation.
- Strong involvement of the federal CIO in the *European subsystem* affected the outcome of the innovation in the sense that the set requirements and developed ideas within the European subsystem were used in the Bürgerkarte subsystem.

5.3 SOCIAL CAPITAL VARIABLES

This section draws conclusions for each of the social capital variables regarding the influence of social capital characteristics on the dynamics of the subsystem and subsequently on the joint, technological innovation process. Each sub-section concludes with an assessment of the influence of the specific variable on the innovation process, outcome and/or impact.

5.3.1 Openness versus group closure

Although the Austrian government chose to implement an open eIDM system, in the sense that all kinds of cards could act as carriers of the Bürgerkarte function, the number of participating parties during the idea and development phase was limited. Actors involved in the development of the concept, and the specifications and requirements of the Bürgerkarte, were the CIO, his ICT Strategy Unit and A-SIT. None of the service providers significantly contributed during this stage. Referring to the limited participation of the regions and municipalities, one of the interviewees stated: 'The regions and municipalities were not involved in the beginning of the innovation process. They became involved in 2004 in the e-Government board, but then the Bürgerkarte project was already in the implementation phase. I think that this is one of the reasons for the low take-up by regions and municipalities; they weren't involved in the early discussions about the Bürgerkarte's specifications and requirements. Now they are not interested; it is not their project. Using the Bürgerkarte concept yields no benefits for the regions and municipalities.' Important service providers on the federal level were not actively involved either, such as the Ministry of Finance (e.g. tax declarations), the Ministry for Education, Arts and Culture (e.g. student registration, benefits), the Ministry of Economy, Family and Youth (e.g. child benefits). Although the CIOs of all ministries were represented in the ICT board, they did not significantly contribute to the definition of requirements of the Bürgerkarte system. Moreover, in 2003 the Ministry of Finance launched their online tax service, while using a different eIDM system than the Bürgerkarte solution.

In addition, several interviewees stated that the ICT Strategy Unit's relative independence reduced potential interference from other government entities (and hence caused group closure). One of the interviewees explained: 'The Stabstelle [ICT Strategy Unit] was not part of the government hierarchy. The idea was to include people from several ministries in the Stabstelle, but to remain independent. Professor Posch recruited employees from several ministries. This was not the normal recruitment procedure. Normally the superior of an employee has to approve the shift to another ministry, but in this procedure Mr. Posch could pick the employee he wanted from the ministries. He had interviews with several employees and chose the people who fitted the team. He selected the people who were very motivated to work on his team. […] We had a very close team.' And another person involved: 'Not all ministries had someone who fitted the criteria and in these instances people were hired. […]We [the ICT Strategy Unit] had a special position; we did not have to answer to any of the top officials, only to professor Posch and the chancellor. We did not even reside in the chancellery; we worked at a Regus office – some building where businesses can rent rooms. We had an ambitious and tight team. Mr. Posch had a very independent position as he was not paid by the Federal Chancellery for his job as federal CIO, but by the university.'

A certain degree of group closure also existed since most technical experts involved in the ICT Strategy Unit were from the Graz University of Technology, Mr. Posch's Institute for Applied Information Processing and Communications.[128] One of them explains: 'Before I joined the Stabstelle [ICT Strategy Unit], I worked for professor Posch's institute. Arno was also from the institute and Herbert worked for A-SIT. A-SIT is closely connected to Mr. Posch's institute. A-SIT is even located in his institute. The official address of A-SIT is the same as the address of the Institute for Applied Information Processing and Communications.' The fact that most technical experts were working for the same institute may have influenced the chosen approach and type of eIDM solution since there was little external contribution and thus no room for alternative technical ideas. Some stated that the approach of the Bürgerkarte project was too technical: 'Since we had a strong technical team and a strong technology-oriented leader [professor Posch], our approach may have been too technical and maybe we paid too little attention to issues such as awareness and innovation adoption.' And: 'We [the ICT Strategy Unit] were technological pioneers; we were pushing the frontier of eIDM innovation. For technicians it was rewarding and a lot of fun. We were running ahead; others, however, remained behind.'

In conclusion, group closure resulted in limited involvement of actors outside the core group, limited promotion of their interests and demands, and therefore also limited willingness of these actors to join up in later phases.

128 http://www.iaik.tugraz.at/

5.3.2 Strength of the ties

The vast majority of interviewees stated that the presence of existing ties played an important role in the innovation process. Overall, it seems that particularly during the initiation and development process, strong ties played an important role in influencing opinions, providing access to strategic information, involving other parties and creating consensus between these parties. Several respondents stated that influencing opinions has predominantly been important at the higher levels of the hierarchy. One of them, for instance, stated: 'At that time [1999], Posch was already very well connected. He had a good relationship with the federal chancellor, Mr. Schüssel. He convinced Schüssel that IT and in particular IT Strategy is not something that one sources out. One may outsource the implementation of an ICT project but not the strategy. He convinced Schüssel of the importance of the ICT Strategy Unit, and this unit was established.'

Various respondents contended that ties can result in access to strategic information. One of the interviewees, for instance, stated: 'In the working groups [which fell under the ICT board], we prepared the decisions to be made by the ICT board. If we could not reach an agreement within the working group, we tried to use other ties or to build coalitions to get the innovation to move in a certain direction. For example, if we knew that the idea had four or five supporters, we tried to convince the sixth to come on board. In this sense we exerted pressure.' And one of the respondents stated: 'To be able to influence the decision process it is very important to know the agendas and interests of the parties involved. […] Ties are used to influence the innovation process. There are informal and formal processes; the working groups are formal, and there are all kind of informal bilateral talks with key players in the field. One can arrange solutions informally and then confirm them formally. To me the informal processes seem to be even more important than the formal processes.'

Some other interviewees stated that strong and medium ties were used to involve parties. In addition, several respondents provided examples of the transferability of ties. For example, one of the statements made was: 'I did not use my own ties that much, but the ties of Mr. Posch. […] Posch asked me to arrange a kick-off meeting and gave me a list of people whom should be invited. I started to call the people to invite them and one of the top officials of a ministry said to me "Oh, that is very interesting. I will have a look at my calendar for the coming days. Call me back on Thursday." When I hung up I thought: "I'm being given the runaround." So I decided to have a coffee and passed Mr. Posch's office. He was in his office, so I told the story and he laughed. When I came back from my coffee I was called by the top official who said that he would attend the kick-off. Obviously, Posch had contacted him.' Weaker ties have also been used to involve stakeholders. An example is the participation of service providers. Both the Social Security Agency and the Austrian Computer Society have been involved through existing ties. One of the interviewees stated about the involvement of the Austrian Computer Society: 'Both Alexander and Mr. Posch already knew many people there [Austrian Computer Society]. They were involved in the working groups. Of course, their

ties played a role in the involvement of the Austrian Computer Society. They suggested to the Austrian Computer Society to become involved.'

In addition, diverse interview reports reveal that strong ties have been used for parties to reach consensus. A clear example is the strong cooperation between the Federal CIO and the Austrian Data Protection Commission (Österreichische Datenschutzkommission). One of the involved parties reported the following about this: 'We had already known each other for a long time back then. We worked together on several projects. We started to discuss the Bürgerkarte project informally. The threshold to start communicating about the project was very low and we subsequently started the cooperation.' Someone else stated: 'Mr. Posch and Ms. Kotschy [Data Protection Commission] have an excellent relationship. I consider them as friends. It helped the cooperation between them. Ms. Kotschy's network at the federal Chancellery is also excellent. She has good connections with many legal experts there.' And: 'Without the close cooperation between Posch and Kotschy things would have been more difficult. Probably there would have been more resistance from privacy advocacy groups.'

And finally, it appears that strong ties were used to escalate a situation: 'As the ICT Strategy Unit, we had a very good standing with the chancellor. In two or three instances we had such a difficult situation that we had to escalate to the chancellor. The chancellor then solved the issue with the responsible minister.'

To summarize, the research findings show that both weak and strong interpersonal ties were used to influence opinions, to gain access to strategic information, to involve parties and/or to reach consensus.

5.3.3 Heterogeneity of the network

The heterogeneity of the group involved in the development of the Bürgerkarte concept was relatively low. Although the employees of the ICT Strategy Unit were recruited from several ministries, the profile of the employees was quite comparable. Most of them were young, male, ambitious and had a specific interest in ICT. Someone stated about the ICT Strategy Unit: 'We had a young team; most of us were like-minded people. We were young, enthusiastic, worked long hours.' Another stated: 'Posch, and therefore the ICT Strategy Unit, had a strong engineering perspective. Because of this focus on technology, we had a very interesting and sophisticated Bürgerkarte concept. The concept, however, did not work out because we did not involve other perspectives, such as of users or service providers.'

Overall, homogeneity of the group involved in the idea and development phase of the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.

5.3.4 Broker's position

Notable is the central position of one of the actors of the network, namely professor Reinhard Posch, who held several key positions in the network. He was federal CIO, scientific director of A-SIT, advisor at the Social Security Agency, head of the Institute for Applied Information Processing and Communications (IAIK) at the Graz University of Technology[129] and participated in the negotiations for the directive on a common framework for electronic signatures of the European Union.[130] He was one of the best-connected persons of the Bürgerkarte subsystem (in terms of number of connections and access to high-level positions) and mediated between the interests of several involved parties; for instance between his institute IAIK at the Graz University of Technology, A-SIT, the Federal Chancellery, the European Commission and some service providers, such as the Austrian Computer Society (where he chaired a working group) and the Social Security Agency (where he was advisor). The majority of respondents contended that through this strategic position in the network Posch was able to significantly influence the innovation process. On of the actors explained: 'When you have so many influential positions at the same time, you have a lot of strategic information about the interest of the parties, which strengthens your position even more. You are able to steer the innovation in a certain direction. […] You are able to connect people from diverse organisations and their interests.'

The level of influence of people who had low connectivity within the Bürgerkarte subsystem is also interesting. An example is the position of the CEOs at A-Trust. Because A-Trust's management changed several times during the project, and A-Trust was a private sector partner, they were merely weakly connected to the other actors within the subsystem. One of the CEOs explained his position as follows: 'I was totally new in the network. I did not know a single person. A-Trust had all kind of problems, so what could I do? I made a business plan and started to build up my network. I had talks with Mr. Posch, someone at the Social Security Agency and Hans Zeger, and tried to build a relationship with them. […] I needed these relationships in order to promote the interests of A-Trust.' There was one member of the ICT Strategy Unit who did not have any connections when he joined the unit. However, as he was Mr. Posch's employee, he could use the latter's ties. His strong tie with Mr. Posch strengthened his position within the subsystem, since these ties were transferred to him (transferability of ties).

In conclusion, actors with a strategic position in the network were in a better position to influence the direction of the innovation.

5.3.5 Interpersonal trust

According to the majority of respondents, the level of trust between actors has significantly affected the dynamics of the subsystem and the innovation process.

129 http://www.iaik.tugraz.at/
130 http://www.kuppingercole.com/speakers/268

The ICT Strategy Unit can be characterised as a high-trust network. The majority of respondents involved in this unit have stated that the level of interpersonal trust was very high. One of them, for instance, explained: 'We had an intimate cooperation in the ICT Strategy Unit. We could really rely on each other. […] The meetings were informal; we did not always make minutes of the meetings. Sometimes we made minutes so as not to forget what we should do, but we didn't do this to ensure that people would act as they had said. I never had the feeling that one of the members would act in an unreliable way.' Someone else: 'Of course we had a warming-up phase, but interpersonal trust grew very fast. In any case, the best idea prevailed, it did not matter who had the idea. We exchanged all information without restrictions. […] We needed this high level of trust since we worked in a high-risk environment. The technology was very new and the project could fail.'

The degree of interpersonal trust also played a bilateral role. One of the involved actors stated: 'Posch and I have a very good relationship. Without the interpersonal trust, the cooperation would not have functioned. We had to bring the legal and technical work together, which is a challenging job. In those instances trust is needed. […] Trust is built on expectations, experiences, but also the sharing of values. If one harms the trust of the other party, the cooperation becomes more difficult; people become more careful and are less willing to exchange information or to experiment together.' And another actor: 'The level of trust between Rupp and Posch was low. They tried to formally divide responsibilities in order to deal with the low-trust relationship. They separated their tasks. […] This may have impacted the innovation process in the sense that a closer cooperation between Rupp and Posch would have improved the eID concept on the one hand and enhanced the dissemination on the other hand.'

Several interviews reveal the connection between the level of trust needed and the presence of risks. In particular the political environment was perceived as being risky. A respondent explained: 'The level of trust in the ICT Strategy Unit was very high; however, outside the unit it was much lower. In our interaction with other ministries we had to be very careful of what we said. There were conflicting interests and matters can become politically sensitive. Before a meeting with people outside the unit we discussed what we could tell others and what not. We asked ourselves: is it the right time to raise this or that issue?' There are several examples where trust was counterbalanced by formal agreements. One of the involved actors said: 'In the ICT board, minutes were very important. The minutes were used as a kind of contract; a formal confirmation of the agreements reached. There were several instances where we had to refer to the minutes.'

The interviews also demonstrate that the necessary level of trust depended on the degree to which the interests of involved persons and/or organisations dovetailed or actors were dependent on each other. Someone explained: 'I do not trust Mr. Posch. He is one of those people who changes his ideas very frequently. […] But we are all in the same boat: if A-Trust fails, the Federal Chancellery will fail too. We both want to make the Bürgerkarte innovation a success.' In addition, the respondents referred to hierarchy, which can be used as compensation for the lack

of trust: 'I know Mr. Posch's boss quite well. I do trust him [Mr. Posch's boss]. When I do not agree with Mr. Posch, I can go to his boss and arrange things.' And about interdependencies: 'At first I did not trust him, but I made a deal with him. We now have an agreement: I will not talk about his certificate business [which may imply reputation damage], and he will not publish any negative articles about my company.'

In conclusion, the presence of interpersonal trust increased the willingness of actors to take risks and experiment. Low levels of trust were compensated by hierarchy, contracts, interdependencies or aligned interests.

5.3.6 Conclusions

It seems that the characteristics and dynamics within the subsystem significantly influenced the joint technological innovation.

- *Group closure* mechanisms resulted in limited contributions by actors outside the ICT Strategy Unit, which decreased the inclusion of their interests and demands and subsequent willingness to adopt the system.
- *Interpersonal ties* affected the involvement of parties, the application of strategies and decision making.
- The *homogeneity* of the group affected the characteristics of the innovation and consequently the degree of willingness of certain parties to adopt the innovation.
- The actors in the subsystem who had a *strategic brokerage position* had a greater influence on the innovation process than people with a less strategic position.
- The *presence of trust* made actors more willing to take risks and to experiment with new technology.

5.4 OVERALL CONCLUSIONS

Regarding the parameters of the framework used for this research, the following aspects appear to have influenced the dynamics of the subsystem, the innovation outcome and/or impact:

- The *attributes of the Bürgerkarte concept* affected the number of card providers involved in the innovation. In addition, the complexity of the identification scheme and the cumbersome (re)activation process resulted in its limited adoption by service providers and citizens.
- *Inadequacies in the financial model*, which were caused by flaws in the dissemination model (limited take-up by service providers and end-users), impacted the dynamics of the subsystem in the sense that it led to much negotiation between involved parties and eventually to new funding and cost models.
- The importance attributed by developers of the Bürgerkarte solution to *values such as security and the use of advanced technology* impacted the features

of the innovation and yielded a limited take-up – and thus impact – of the innovation

- The basic *legal structure* did not substantially affect the dynamics of the subsystem, but did affect the innovation impact.
- There is no sound evidence that the *changes in socio-economic conditions and technology* affected the dynamics of the subsystem.
- There is no evidence that the *many articles* about the Bürgerkarte concept and project in the newspapers (e.g. Die Presse) significantly affected the dynamics of the subsystem, innovation output or impact.
- The *governing coalitions* did not substantially change over time. The changes in the CIO's the strategic team, and the changed position of the strategic team, did not have a substantial impact on the dynamics of the subsystem or innovation.
- Strong involvement of the federal CIO in the *European subsystem* affected the outcome of the innovation in the sense that set requirements and developed ideas within the European subsystem were used in the Bürgerkarte subsystem.
- *Group closure* mechanisms resulted in limited contributions by actors outside the ICT Strategy Unit, which decreased the inclusion of their interests and demands and subsequent willingness to adopt the system.
- *Interpersonal ties* were used to influence opinions, gain access to strategic information, involve parties and/or reach consensus. The use of the ties for these purposes affected the involvement of parties, the application of strategies and decision making.
- The *homogeneity* of the group involved in the development of the Bürgerkarte innovation affected the characteristics of the innovation and consequently the degree of willingness of certain parties to adopt the innovation.
- One of the actors in the subsystem, who had a *strategic brokerage position*, had great influence on the innovation process since he could influence agendas, control the flow of information and act as a bridge between interests.
- The *presence of trust* made actors more willing to take risks and to experiment with new technology.

6
The Belgian BEPLIC

This sixth chapter describes the case of the joint development of the Belgian eIDM system, the BELPIC. As mentioned in the last section of the methodological chapter (chapter four), the empirical chapters consist of four main parts. The introductory section describes the innovation process chronologically along the innovation stages (initiation, development, implementation and diffusion). Conclusions are drawn regarding the application of strategies, decision making and the outcome and impact of the innovation. The second section presents evidence found regarding the impact of Advocacy Coalition Framework parameters and events. Each sub–section draws a conclusion about the specific effects of the variable. The influence of social capital variables is explored in the third section. For the five dominant network and tie characteristics (network closure, strength of ties, heterogeneity, broker's position and levels of trust) an overview is provided of the perceived impact by involved actors. The sub-sections of this third section conclude with an overview of the key impacts of the specific variable. The fourth (and final) section draws conclusions regarding the influence of the framework variables.[131]

6.1 INTRODUCTION

In this first section, the successive innovation stages of the development of the BELPIC will be described. Of each innovation stage (initiation, development, implementation and diffusion), the most important actors involved, strategies applied and decisions made, are described. The last section of this section provides a summary of the key actors, strategies and decisions and gives insight into the outputs and impacts of the innovation process.

6.1.1 Initiation phase

The initial thoughts about a Belgian eID were inspired by the European Commission's preparations of the e-Signature directive.[132] One of the respondents stated

131 All websites mentioned in this chapter have been accessed between September and December 2009.

132 http://europa.eu/legislation_summaries/information_society/l24118_en.htm

about the onset of the Belgian eID development: 'The need to create an electronic identity card for Belgian citizens was addressed in 1998 by Jos Dumortier, an ICT and law professor at the Katholiek Universiteit Leuven who had been involved in the development of the European Commission's e-Signature directive and also worked as an advisor to the Ministry of the Interior. He advised the Ministry of the Interior to start the implementation of the directive in time since a great deal of legal and technical work had to be carried out.' The National Register Department[133] of the Ministry of the Interior commissioned researchers of the ICRI[134] and COSIC[135] departments of KU Leuven in 1999 to develop the legal framework and technical specifications for an electronic identity card for Belgian citizens. The proposals made by the ICRI and COSIC researchers on the legal framework and technical specifications were discussed within a working group which consisted, in addition to the researchers, of representatives of the National Register Department, the federal ICT agency Fedict and the Crossroads Bank of the Belgian Social Security.

The Cabinet of Ministers formally decided to develop an electronic identity card on 22 November 2000.[136] To assess the feasibility of the concept designed by KU Leuven, the National Register Department of the Ministry of the Interior commissioned the consultancy company CSC Computer Sciences in March 2001 to conduct a concept study.[137] The aim of the study was to explore and assess the concepts and functional requirements of the future electronic identity card. Minister Duquesne of the Ministry of the Interior stated the following during a chamber meeting on 31 January 2002:[138] 'To assess whether an electronic identity card can serve this purpose [to provide citizens with access to e-Government services], a concept study was commissioned. This study was integrally conducted by the consultancy company CSC, which has formally stated in their tender proposal to be fully independent of card producers and network operators. The advisory committee assigned to supervise the study consisted of representatives of the Ministry of the Interior, Fedict and the Crossroads Bank of the Social Security. The aim of the study was to assess the concepts and functionalities of the card. The second part of the project encompasses the definition of tender specifications for the production of the identity cards. The tendering procedures will be as transparent as possible.'

On 19 July 2001, a tangible plan to develop the BELPIC (the Belgian electronic identification card) passed the Cabinet of Ministers.[139] The solution chosen for the BELPIC comprised an identity card with an electronic chip, which was PKI-based. The next step in the process was to start a public tendering process for building a

133 http://www.ibz.rrn.fgov.be/index.php?id=141&L=1
134 http://www.law.kuleuven.be/icri/
135 http://www.esat.kuleuven.be/cosic/
136 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf
137 http://www.csc.com/. The project started on 20 March 2001, and the timeline of the project was four months; two months to carry out the feasibility study and two months to define the technical and functional requirements and specifications. The budget for the project was 166,173 euros.
138 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf
139 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf

development structure for the BELPIC, the production of the card and the development of certificates. The tendering process was coordinated by the Ministry of the Interior, which assigned the building of a development structure to the company Bull N.V. (bought by Steria in January 2002)[140] and their consortium partners Belgacom, Telindus, Cevi, Ciger and Cipal, and the production of the cards and certificates to Zetes and Belgacom, respectively.[141]

6.1.2 Development phase

In January 2002 the building of the development structure by the Steria consortium began. The infrastructure of the National Register (which administers the population data of all Belgian citizens) had to be modified to ensure a secure data exchange between involved parties (e.g. municipalities, certification authority).[142] The technical infrastructure of municipalities had to be modified for this purpose as well. Steria had to deliver the new infrastructures within six months. The project to develop the card and certificates, carried out by Zetes and Belgacom, respectively, started in September 2002 and had a timeline of five months.[143] Several respondents reported on alignment problems between separate (sub) projects. One of them, for instance, stated: 'We had already started the development of the exploitation structure, though it was not clear yet which companies would produce the cards and certificates, and thus the precise characteristics of the cards and certificates wasn't clear either. Because the building blocks of the BELPIC [infrastructure, cards and certificates] were not developed at the same time, there were many change requests for the architecture we developed.'

The majority of involved respondents stated that the timeline for the development of the (elements of the) BELPIC was (too) tight. One interviewee, for instance, explained: 'There was enormous time pressure on the project as the National Register Department wanted to present the first cards by 2003. To be honest, this was a mission impossible. The requirements were very high and the timeline was very short. By 2003, we did not have an accurate BELPIC solution working yet, but the card had to be launched.' On 31 March 2003, the first electronic identity card was presented by Minister of the Interior Duquesne and Minister of Civil Service and Modernisation of the Public Authorities Van den Bossche during the 'eID Contactdag'. The Contactdag was organised for municipalities, businesses and citizens and was attended by over 1,300 people.[144]

140 http://www.computable.nl/artikel/ict_topics/ictbranche/1329049/2379258/steria-laat-nederland-links-liggen-in-overname-dienstentak-bull.html
141 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf
142 http://www.elections.fgov.be/index.php?id=1314&no_cache=1&L=1.#irfaq_a_1_ba541
143 The Cabinet of Ministers decided to assign these projects to Zetes and Belgacom on 27 September 2002. http://www.elections.fgov.be/index.php?id=1314&no_cache=1&L=1.#irfaq_a_1_ba541
144 http://webrrn.rrn.fgov.be/index.php?id=1314&no_cache=1&L=1&tx_irfaq_pi1%5Bcat%5D=123#irfaq_a_1_149c4

6.1.3 Implementation phase

The Contactdag was also the start of the BELPIC pilot implementation in 11 municipalities, namely: Borsbeek, Geraardsbergen, Jabbeke, Lasne, Leuven, Marche-en-Famenne, Rochefort, Seneffe, Seraing, Tongeren and Sint-Pieters-Woluwe.[145] Various interview reports indicate that the selection of the pilot municipalities by the National Register Department was highly strategic. One of the respondents, for instance, stated about the selection: 'It was important to achieve parity, to have an equal representation of the French, Flemish and German-speaking areas, small and larger municipalities and the various regions. In addition it was important to select those municipalities whose ambitions dovetailed with the BELPIC roll-out.'

Simultaneously to the pilots, the central government worked on the legal implementation of the BELPIC. In February 2003, the sectoral committee of the National Register[146] was established to assess – in concrete requests for access to personal information – whether the requirements of the legislation concerning population registration and privacy law were met.[147] More specifically, the committee assessed whether the purpose behind data access requests at the National Register was well-determined, clearly formulated and legitimate.[148] The sectoral committee of the National Register is one of the six sectoral committees which make up the Belgian Privacy Commission.[149,150] In March 2003, the 1983 and 1991 National Register laws were amended so the National Register could be used as an authentic source of electronic identity data.[151] To prepare for these modifications, the Privacy Commission had been asked for advice.

The pilot phase of the BELPIC was completed by the end of 2003, at which point around 55,000 electronic identity cards had been distributed by the pilot municipalities.[152] Various respondents reported on the difficulties they faced during the implementation phase. One of them, for instance, stated about the involvement of their municipality: 'We faced quite some challenges during the pilot project. The system developed by the supplier did not fit the ICT infrastructure of the municipality and there were many teething problems. The technology was not mature enough and over time we had to make many changes.'

145 http://www.juridat.be/cgi_loi/loi_N.pl?cn=2003032532
146 http://www.privacycommission.be/nl/decisions/national_register
147 http://www.dekamer.be/FLWB/pdf/50/2226/50K2226007.pdf
148 http://www.juridat.be/cgi_loi/loi_N.pl?cn=2007051542
149 http://www.privacycommission.be/nl/sectoral_committees
150 The committee consisted of the same members as the Committee of the Social Security Sector: http://www.ksz-bcss.fgov.be/nl/bcss/nodepage/content/websites/belgium/about/committee.html
151 http://www.fidis.net/resources/deliverables/privacy-and-legal-social-content/d133-study-on-id-number-policies/doc/12/
152 http://www.zdnet.be/news/38028/elektronische-identiteitskaart-vier-keer-duurder/

6.1.4 Diffusion phase

On 20 March 2004, after a positive pilot evaluation conducted by the National Register Department, the decision to introduce the electronic identity card nationwide was made by the Cabinet of Ministers and enacted by Royal Decree.[153] The Royal Decree of 1 September 2004 entails the decision to generally implement the electronic identity card in Belgium.[154] The programme law of 9 July 2004 supports the establishment of a governmental agency (staatsdienst) responsible for the management of the electronic identity cards.[155] In 2004 Fedict[156] became responsible for the management of the electronic identity card.[157] In addition, the federal government organised training sessions for the employees of municipalities and provided municipalities with extra human resources for the duration of three years.[158] Technical support was provided by the BELPIC helpdesk, a unit of the National Register Department.

The roll-out of the electronic identity card among the 578 municipalities (pilot municipalities excluded) was divided into three phases. In the first phase of October 2004, the electronic identity card was implemented in the first group of municipalities, while the second group was implemented in December 2004 and the third in February 2005.[159] In 2005, a member of parliament posed questions on the implementation of the electronic identity card since, according to this person, municipalities were facing important installation problems.[160] Minister Dewael answered that the arguments of the member of parliament were based on an incident in one municipality and that – according to his information – system failures were scarce and the system had been available for 99% of the time.

In 2006 and 2007, criticism of the BELPIC increased. This negative attention was caused by (among other things) a study of Fedict on people's internet use, e-Government applications and eID.[161] The report demonstrated that although 60% of Belgian internet users had an eID in 2006, its use was very low. Only 28% of internet users in possession of an eID had used it at least once.[162] In 2008, the disappointing use of eIDs was confirmed by a report issued by the Federal Government

153 http://www.poureva.be/IMG/pdf/DOC_51_1371_021.pdf
154 Belgisch Staatsblad, 15 september 2004.
155 http://www.verkiezingen.fgov.be/fileadmin/user_upload/ADIB/jaarverslagen/2004/1_15_24_c_bevolking.pdf
156 An executive agency of the Ministry of the Interior established in 2001.
157 http://www.fedict.belgium.be/nl/
158 'Verantwoording van de algemene uitgavenbegroting', 9 November 2005, http://www.dekamer.be/doc/flwb/pdf/51/2044/51k2044003.pdf
159 http://www.dekamer.be/doc/flwb/pdf/51/2044/51k2044003.pdf
160 CRIV 51 COM 603 18/05/2005 Chambre-3e session de la 51e legislature 2004, kamer-3e zitting van de 51e zittingsperiode 45, http://www.dekamer.be/doc/ccri/pdf/51/ic603.pdf
161 http://www.fedict.belgium.be/nl/binaries/diversiteit_tcm167-16726.pdf
162 Fedict, (2007), 'Fed-e View Citizen, Longitudinaal onderzoek naar internet en e-Government in België. De burger aan het woord', pp. 21-2. The most important applications for which the eID was used in 2006 concerned entrance to public spaces, such as libraries and waste and recycling centres, and retrieval of official documents at local governments.

Agency, Federale Overheidsdienst Economie, K.M.O., Middenstand en Energie.[163] The report demonstrated that in 2008 the card was not as successful as the Belgian authorities had expected.[164] Important conclusions were that the number of services accessible through eID was limited and only gradually growing, and that there was a limited willingness among end-users to install the card reader and software. In addition, the report concluded that there were crucial privacy questions and that the technological infrastructure lacked maturity.

In 2009, the federal government started to intensify their communication to stimulate the take-up of the electronic identity card by citizens and businesses. Several eID road shows were organised by the Ministry of the Interior to promote the electronic identity card as a user-friendly and secure solution.[165,166] In addition, a community event was organised in 25 municipalities during which informational videos were presented, and representatives of the Ministry of the Interior were present in a stand to provide the public with information on tangible applications of the electronic identity card.

Although the Minister of the Interior stated in a 2009 chamber meeting that no statistics on the use of the Belgian eIDM solution were available,[167] several studies strongly indicate that take-up was low. A survey among 1,000 employed Belgian citizens carried out by Indigov, for instance, showed that 1.8% of the BELPIC owners in the reference group had used their card to sign an electronic form, and 3.3% had used it for identification and authentication purposes.[168] In addition, an overview of the online services accessible through eID on the federal eID website reveals that the number of services in November 2009 was still relatively low.[169] In some municipalities citizens can change their address while using their eID or retrieve a birth certificate. On police-on-web,[170] citizens can report certain criminal offences and citizens can submit their tax declarations on tax-on-web.[171] The eID website of the federal government mentions all kinds of future services of the eID, including e-Learning and e-Health applications. However, thus far these services have not been implemented. Moreover, a study carried out by Indigov in 2008

163 Federale Overheidsdienst Economie, K.M.O., Middenstand en Energie, (2008), 'Toekomstgerichte studie over de potentiële economische mogelijkheden van het gebruik van de elektronische identiteitskaart en de elektronische handtekening', Brussels.

164 FOD Economie, K.M.O., 'Middenstand en Energie', 2008:6.

165 http://www.elections.fgov.be/index.php?id=2585&L=1

166 http://welcome-to-e-belgium.be/. During a road show, which was held in 70 municipalities, information to the public was provided in an eID bus. The bus provided citizens with an overview of current and future eID applications.

167 The Minister of the Interior stated in 2009 during a chamber meeting: 'Er bestaan geen statistieken maar het gebruik van de toepassing TAX-ON-WEB geeft een indicatie. De jaarlijkse toename van het gebruik van deze toepassing biedt vertrouwen': translation 'There are no statistics available, but the use of the TAX-ON-WEB application gives us an indication. The annual increase of the use of this application inspires confidence.' http://www.senate.be/www/?MIval=/Vragen/SchriftelijkeVraagPrint&LEG=4&NR=3191&LANG=fr

168 Indigov, 'SAP onderzoek: Belgen verdeeld over gebruik van eID op het werk', Brussels, 3 March 2010, http://www.sap.com/belux/about/press/press.epx?pressid=11809

169 http://welcome-to-e-belgium.be/nl/home.php?nav=6

170 https://policeonweb.belgium.be/eloket/selectComplaintTypeAndAuthentication.action

171 http://ccff02.minfin.fgov.be/taxonweb/app/citizen/public/taxbox/home.do

showed that a mere 30% of the local government used eID for the provision of online services.[172] One of the respondents stated about the current dissemination of the eID: 'There are still some important problems. The number of services is limited and also the use of eIDs by citizens. The service providers have to change their infrastructure in order to start using the eID and are not always willing to do so, especially because the use of eIDs by citizens is very low.'

Federal government policy documents state that one of the most important goals regarding the Belgian electronic identity card in the coming years will be the integration of the card with the social security (SIS) card and the subsequent stimulation of the use of the Belgian eID.[173]

6.1.5 Conclusions

The most important actor involved in the BELPIC innovation was – and still is – the National Register Department of the Ministry of the Interior. This department initiated the innovation and is still responsible for the solution and its dissemination today. At the onset of the innovation, other important players were the COSIC and ICRI departments of KU Leuven. They provided the National Register Department with legal and technological knowledge on eIDM systems. The suppliers of the infrastructure and the BELPIC card predominantly had a compliant role since the National Register Department was the project commissioner and exercised strong control over the project. The suppliers had to carry out the project according to the National Register Department's strict requirements. In the implementation and diffusion phase, the municipalities and regions became involved as they had to implement the system designed by the National Register Department and the suppliers. The implementation of the BELPIC system was imposed by law, and therefore the role of the municipalities was also compliant.

The strategy chosen by the National Register Department was to implement a highly secure smart card containing a qualified certificate and to make it obligatory for municipalities to implement the system and for citizens to have a BELPIC. This strategy ensured its implementation by municipalities and its diffusion among citizens. However, what was not ensured by this strategy, was the development of services by municipalities and the actual use of the BEPLIC card by citizens for electronic identification purposes. As illustrated in the previous section, over time several studies have shown that although almost all Belgian citizens have a BELPIC card, since it is obligatory, its use in terms of obtaining electronic services is low. In addition, the number of government services available through the BELPIC solution is also low. Consequently, one has to conclude that whereas the Belgian government has developed a highly secure and sophisticated eIDM solution, the impact of this innovation is as yet limited.

172 'Gemeentelijke websites: de inhoud is er, nu de service nog', 17 September 2008. http://monitor.indigov.be/UserFiles/Persbericht_20080917_eGOV_Monitor.pdf

173 http://www.ibz.fgov.be/download/activiteitenverslag_2007/Instellingen%20en%20bevolking/55298%20Instell_Bevolk_NL.pdf

6.2 PARAMETERS AND EVENTS OF THE ADVOCACY COALITION FRAMEWORK

This section explores the influence of the Advocacy Coalition Framework parameters and events. An assessment is made for each parameter and event to discover whether and how the parameter or event affected the joint innovation process.

6.2.1 Attributes of the good

The federal government considers the BELPIC, Belgian Personal Identity Card, to be the most significant Belgian eIDM system, and it is meant to facilitate access to e-Government services for all Belgian citizens from the age of 12 years onwards.[174] Whereas the BEPLIC is currently mostly used for public sector applications, the solution is also available for take-up by the private sector. Other eIDM systems applied in the public sector are the social security card (SIS card) and the kids-ID (an eID card intended for children under the age of 12 years.).

The BELPIC card contains a chip with two certificates: one for authentication purposes and one for qualified signatures, with only the latter being qualified. The card can be used by citizens to obtain electronic services in combination with a 'private key'; that is, a private four-digit PIN code. The PIN code is initialised randomly when the card is first issued, but can be changed at will by the user. When accessing a government website to obtain a service that requires identification, the citizen has to insert his or her BELPIC card into a card reader. Subsequently, the citizen has to enter the PIN code (private key), which allows the government application to read out data from the BELPIC card and to compare the card data with data stored in the Belgian National Register. Based upon the information exchange between the BELPIC card and the Belgian National Register, the citizen is identified and/or authenticated to obtain the service and/or sign the document.

Cards are issued by municipalities (which function in this regard as a so-called 'local registration authority' on behalf of the National Register Department) and have a validity of five years. The price of the card varies from municipality to municipality, but generally ranges between 10 and 15 euros. The cards are produced, initialised and personalised by the company Zetes, a card manufacturer. The certificates are managed by Belgacom, which functions as a certification authority, with Certipost (a joint venture between Belgacom and the Belgian Post) acting as the certificate service provider. By the end of 2009, all Belgian citizens above the age of 12 years had received an eID. Belgium is the only country adopting an opt-out strategy related to both certificates of the eID card, meaning that the certificates are activated as a default.[175] Belgian citizens are obliged to have a BELPIC card.

174 https://www.cosic.esat.kuleuven.be/modinis-idm/twiki/bin/view.cgi/Main/BelgianProfile Detailed information can also be found through the official Belgian eID website (http://eid.belgium.be), which is available in Dutch, English and French.

175 http://www.ifib.de/publikationsdateien/outline_eID_special_issue_IIS_Sept_04.pdf

An analysis of the interviews shows that in the development phase the specific attributes of the BELPIC innovation did not significantly affect the dynamics in the subsystem. Moreover, the characteristics of the subsystem seem to have substantially affected the features of the innovation. Although the BELPIC system is relatively complex compared to solutions chosen by other EU member states, this did not imply more negotiation, consensus-building or alignment of interests. The majority of respondents stated that actors involved were fairly efficient in developing the solution. As one interviewee stated: 'We merely needed a few meetings to draw up the concept and technical and legal specifications.' And another person involved said: 'Only five people were involved at the development stage of the technical and legal specifications. The decision makers knew the experts very well and knew that their visions of the technology needed were in line. This really accelerated the process.' During the BELPIC concept's first development phase, the group of people involved was small, the network dense and there was a high level of agreement on the goal and technical and legal requirements.

Yet, various interview reports demonstrate that in later stages of the innovation the service providers were reluctant to use the BELPIC solution to provide electronic services to citizens. One of the main reasons for their reluctance was that the features of the system required major changes to be made to municipal back-office systems in order to create the online service. One of the actors, for instance, stated in this respect: 'The municipalities are obliged to issue BELPIC cards. They are the local registration authorities, and the law decrees that they distribute identity cards. In the BELPIC's case, the paper-based card was simply replaced by the digital card. Although they [municipalities] have to use the BELPIC to identify citizens in offline or online processes, they are not obliged to create services that are supported by the BELPIC card. As it is quite complicated to implement the system for online services, the willingness of municipalities to create those services is limited. […] The same goes for other service providers, such as ministries. For them, there is even less incentive since they are not obliged to use the BELPIC card for offline or online identification. The SIS card is used for social security, for instance.'

Furthermore, evidence from formal documents and the interviews shows that the attributes of the systems did not play a role in whether citizens obtained an electronic identity card or not. As stated before, citizens are obliged to have an identity card, the paper version of which was replaced by an electronic identity card (the BEPLIC card). However, several studies show that the attributes of the system did play a role in the use of the identification and signature function of the BELPIC. A study by Fedict on citizens' use of internet, e-Government applications and eID,[176] showed that in 2006 use was very low. Even though 60% of Belgian internet users had an eID, a mere 28% of these users had used it at least once. Moreover, a survey carried out by Indigov revealed that a mere 1.8% of the 1,000 respondents had used the BELPIC to sign an electronic form, and that 3.3% had used it for identification and authentication purposes.[177]

176 http://www.fedict.belgium.be/nl/binaries/diversiteit_tcm167-16726.pdf
177 Indigov, 'SAP onderzoek: Belgen verdeeld over gebruik van eID op het werk', Brussels, 3.

Overall, it seems that the system's selected features were highly influenced by the ideas and vision of the few public officials and experts involved at the onset of the innovation. In addition, it appears that the specific attributes of the eID card did not affect the involvement of municipalities as issuers since they were legally obliged to issue the BELPIC card. Nor did the features impact the take-up of the BELPIC by citizens, since they were obliged by law to have a BELPIC. The characteristics, however, decreased the willingness of service providers and citizens to use the eID system for online services or to sign documents.

6.2.2 Basic distribution of resources

Based on document research, the following overview of costs related to the BELPIC innovation can be generated:

- The total funding needed to build the development structure was 17,804,648 euros.
- The yearly operation costs were estimated at (in total) 2,325,434 euros.[178]
- The cost of the card was estimated at 9 million euros.
- Bull and their consortium parties received 9,966,710 euros from the National Register Department for the modification of the infrastructure (mainframe) of the National Register and for changing the RAPC software Registration Authority Personal Computer of municipalities.
- The Belgacom and Zetes consortium received 7,837,937 euros from the National Register Department for the development of certificates and the smart card, respectively.
- The cost of the feasibility study was 166,173 euros (including VAT), the cost of which was paid by the National Register Department to the CSC consultancy company.
- The total budget for the pilot phase was 9,966,710 euros, and the budget for the roll-out phase was 8,398,024 euros.[179]
- The government responsible for the management of the electronic identity card had the following balance sheets in 2005, 2006, 2007 and 2008 (more detailed information can be found in the annual accounts published on www.dekamer.be):

Table 6. Annual accounts of the government agency responsible for eID cards

Annual accounts of the government agency responsible for electronic identity cards		
Year	Income	Expenses
2004	13,100,000 €	€ 4,129,000
2005	68,873,000 €	€ 52,262,000
2006	41,721,000 €	€ 42,267,000
2007	48,563,000 €	€ 54,095,000
2008	54,305,000 €	€ 62,420,000

178 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf

179 http://www.senaat.be/www/?MIval=/publications/viewSTBlok&COLL=B&DATUM=11/14/2006&DOSID=50346127&MINID=250&LEG=3&NR=79&VTYPE=svid&LANG=nl

Interviews reveal that a scarcity of financial resources and cost management had an influence on the network dynamics in particular in the later stages of the innovation phase and not in the early development phase. Several interviewees stated that, in the late 1990s and the early years of this century, the e-Government budgets were considerably larger than in the past few years. One of them, for instance, stated: 'The eIDM project started during the days of the e-Government hype. Back then, ministers considered it very important to have an e-Government policy, and subsequently there were large budgets for e-Government projects.'

As several interview reports point out, in the implementation phase the ICT budgets of government bodies decreased, which resulted in more negotiation between parties. One respondent, for instance, stated: 'There have been discussions about who should pay for the BELPIC's communication campaign. They [government agencies involved] were hitting the ball into the other court.' According to this same interviewee, this shirking of investment responsibilities had an effect on the innovation process in the sense that 'Communication and information is problem number one in the sense that there is a poor distribution of card readers and poor use of eID cards.' Various respondents stated that the lack of resources in the diffusion phase also put pressure on the subsystem and affected the further development of the BELPIC solution. One of them for instance stated: 'Currently there is no money for further development of the eID system. The kids-ID, which was developed after the BELPIC, does not contain any new technology; it is just a copy of the BELPIC. Of course the National Register Department wants to further develop the card and, for instance, explore the use of biometrics. But there is no money. He [government official] called me recently to ask if I could convince his superior to invest in new technology.' And: 'There are continuous negotiations between parties about the funding of these kinds of projects and existing financial relationships which affect the innovation process.'

In conclusion, the lack of resources in the BELPIC case affected the dynamics of the subsystem in the sense that there were recurrent negotiations about the allocation of resources. In addition, the lack of resources influenced the attributes of the innovation as it limited the choice for technological options (e.g. application of biometrics).

6.2.3 Fundamental cultural values

The network of organisations involved in the development of the BELPIC generally perceived ICT as an important means for improving public administration. This instrumental approach is reflected in several policy documents. The Crossroads Bank and Fedict, for instance, write in their paper 'E-Government: the approach of the Belgian federal administration' that (2003:4):[180] 'These technologies can serve a variety of different ends: better delivery of government services to citizens (especially those living in remote or less densely-populated areas), improved dealings with business and industry, citizen empowerment through access to

180 http://www.ksz-bcss.fgov.be/documentation/fr/documentation/Presse/2003%20-%20E-Government%20paper%20v%201.0.pdf

information and more efficient government management. The resulting benefits may be greater convenience, increased transparency and accountability in public decisions, revenue growth, less fraud and/or cost reductions.' This document also states: 'It is clear that the use of information and communication technologies is only a means to an end. The aim is to deliver better service to all stakeholders in government services. E-Government is a structural reform process based on a view of information as a strategic resource in all areas of government activity.'

That e-Government (and therefore eIDM systems) can be perceived as a structural reform process is repeated in the paper entitled 'e-Government' by the Crossroads Bank (2004).[181] The document gives an overview of the main requirements for an effective realisation of e-Government:

- the vision that information is a strategic production factor for governments
- a user-oriented re-engineering of business processes and the consolidation of value changes
- an interoperability framework
- an integrated information security policy
- a modified legal framework

In addition, the paper states that 'government organisations pay enough attention to an effective and efficient management of information.' According to the Crossroads Bank, this effectiveness and efficiency can be achieved by applying five basic principles: (a) information modelling (the exchange of information based on an information model), (b) registration of data in authentic databases and re-use of information, (c) management of information, (d) electronic exchange of information and (e) data protection (Crossroads Bank 2004:2-4).

The importance of an efficient e-Government policy and implementation is again stressed in the document entitled 'User and Access Management in Belgian e-Government,' written by Frank Robben (2009:1) from the Crossroads Bank,[182] which argues that: 'Efficient e-Government is not possible without integrated information management' and that in Belgium a model is implemented consisting of five building blocks: 'unique identification numbers, the electronic identity card, validated authentic sources, service integrators and sector committees for data protection.' According to the representatives of the Belgian government, the use of this model does justice to both an efficient government and the protection of citizens' privacy: 'By using these building blocks, user and access management is organised according to a generic policy decision model. The objective is to illustrate that integrated e-Government is not necessarily incompatible with optimal protection of privacy.'

181 'E-Government', in VRG-Alumni, Recht in beweging. 11de VRG-Alumnidag 2004, Antwerp-Apeldoorn, Maklu, 2004, pp. 141-66.

182 'User and access management in Belgian e-Government', in Printed proceedings ISSE (Information Security Solutions Europe) Conference 2009, Wiesbaden, Vieweg Verlag, to be published (together with J. Dumortier). https://www.law.kuleuven.be/icri/frobben/publications/2009%20-%20User%20and%20access%20management%20in%20Belgian%20e-government.pdf

The prevailing of public management values is endorsed by the interviewees, who state that the main mission of the BELPIC was to 'modernise the identification of natural persons and to enable citizens and businesses to obtain online services.' In addition, the interviews demonstrate that the parties involved in the BELPIC solution shared some key values. Several interviewees, for instance, mentioned respect and non-intervention principles. One of the interviewees explained: 'Each secretary general has his own autonomy. They do not interfere in each other's policy domains.' And another interviewee stated that: 'In Belgium, the social security sector and the national register are two separate worlds, each with their own rules, funding and dynamics. Although there might be some data exchange between these sectors, they are highly independent from each other and do not accept any intrusion from other parties.' A third interviewee: 'For him [top official], formal responsibilities are very important. Something belongs to his responsibility or not, and he makes his decisions based on this.' In addition, as regards the value 'respect', several interviewees also mentioned 'the loss of face' as an important determinant for decisions made by top administrators. One of the interviewees explained this mechanism as follows: 'Changing the system could imply a loss of face for the involved CEO of the government body; therefore they will only change plans if there is momentum to do so, for example if they can introduce the new system as a new version of the old one and not as a replacement of the old one.'

In conclusion, several values have affected the dynamics of the innovation process. In particular non-intervention principles resulted in limited cooperation between ministries, and loss of face led to limited willingness of involved actors to change strategies. In addition, new public management principles were important for the initiation and shape of the BELPIC solution.

6.2.4 Basic legal structure

The main legal framework for the eID card is laid down in:[183]

- the law of 19 July 1991 regarding the National Registers and identity cards, which is the basic legal source;
- the e-Signature law of 2001 transposes the provisions of the e-Signatures Directive (but does not apply to authentication as such);
- the Royal decree of 25 March 2003 on identity cards, which introduced the basic provisions with regard to the eID card;
- the Law of 25 March 2003, modifying the law of 8 August 1983 establishing a National Register of natural persons and the law of 19 July 1991 regarding the National Registers and identity cards and modifying the law of 8 August 1983 establishing a National Register of natural persons, which modernised these existing registers, in particular with a view to using them as an authentic source for electronic identity data;
- the Royal Decree of 5 June 2004 establishing a system of rights of access to and correction of the information which is electronically stored on the

183 https://www.eid-stork.eu/index.php?option=com_processes&act=list_documents&s=1&Itemid=60&id=312

identity card and of the information stored in the National Registers or in the National Register of natural persons;
- the Royal Decree of 1 September 2004 related to the general introduction of the electronic identity card, through which the roll-out was extended outside of pilot municipalities.

Other relevant legislation includes:
- the Law of 16 January 2003 establishing a Crossroads Bank of Enterprises, modernising the trade register, establishing accredited enterprise counters and pertaining to diverse other provisions;
- the Law of 15 January 1990 establishing and organising a Crossroads Bank of social security;
- the Law of 9 July 2001 establishing certainty with regard to the legal framework for electronic signatures and certification service providers.

As stated in previous sections, the BELPIC card is mandatory for citizens 12 years of age and older, and municipalities are legally obliged to issue BELPIC cards. In addition, the use of the eIDM system by private sector parties is restricted by the law of 19 July 1991, which states that private parties cannot access the National Register or use the National Register number for internal information management. Exceptions are made for private organisations that received a specific mandate by law or by virtue of the sector committee of the National Register (a department of the Belgian Privacy Commission) to access the National Register and use the National Register number. Since the eIDM system largely depends on access to the National Register, using the National Register number as a unique identifier, the use of the eIDM system by the large majority of private parties is problematic.

Although several interview reports reveal that (among other factors) the restrictions for private sector use of the BELPIC system hampers the take-up by private sector parties, the reports also reveal that the legal framework did not hamper the development of the BELPIC solution nor its use by public sector parties or citizens. Moreover, several respondents have stated that the drafting of new legislation went very smoothly. In the concept phase, the National Register Department, together with legal experts of KU Leuven, prepared the legal framework of the BELPIC. One of the interviewees, for instance, argued: 'He [top official] was not only the CEO of Fedict and the Crossroads Bank, but also the chairman of the Privacy Commission. He knew the views held by members of the Privacy Commission and could anticipate those views by addressing all the issues which he thought would be raised.' Another interviewee stated that: 'Of course the fact that he [top official] was [involved in the group that prepared the concept and] the chairman of the Privacy Commission had an effect on the quick adoption of new legislation. As I stated before, since everyone had their own competences, there was no conflict between design and legislation.'

Furthermore, the fact that the eID card is mandatory for citizens 12 years of age and older, has impacted the take-up of the eID card, but not the use of the eID system by citizens for obtaining online services. This use is voluntary and still rather low. In addition, the legal obligation of municipalities to issue the BELPIC card affected their

adoption of the card, but not their provision of online services supported by the card. As stated in previous sections, only the issuing of the card is obligatory. Several respondents stated that - as the use of the BELPIC card for online identification purposes implies large-scale modifications of back-office systems – the willingness of municipalities to use the BELPIC for online service provision is limited. One of them, for instance, explained: 'The municipalities are obliged to issue BELPIC cards. They are the local registration authorities, and it is arranged by law that they distribute identity cards. In the BELPIC case, the paper-based card was simply replaced by the digital card. Although they [municipalities] have to use the BELPIC to identify citizens in offline or online processes, they are not obliged to create services supported by the BELPIC card. As it is quite complicated to implement the system for online services, the willingness of municipalities to create those services is limited.'

In conclusion, it appears that the legal framework has affected the limited take-up by private sector parties (as use is restricted), affected the nationwide take-up of the card by municipalities and citizens (as it was obligatory), but did not affect the use of the card for online identification purposes by municipalities and citizens. In addition, the legal framework did not have a substantial impact on the dynamics of the subsystem (e.g. the drafting of new legislation), but the subsystem did have a significant impact on the drafting of new legislation.

6.2.5 Changes in socio-economic conditions and technology

During the development, implementation and diffusion process of the BELPIC, one of the most important changes in Belgium's socio-economic conditions was the burst of the internet bubble in 2001. In the years 1998, 1999 and 2000, the annual GDP growth was 1.7%, 3.4% and 3.8%, respectively.[184] In 2001, 2002 and 2003, the growth dropped to 0.8%, 1.5% and 1%. The Belgian economy recovered in the years 2004 to 2007 with respective growths of 2.8%, 2.2%, 3%, and 2.6%.

Figure 7. Belgian gross domestic product, 1980-2009

184 http://www.indexmundi.com/belgium/gdp_real_growth_rate.html

Another socio-economic change during the innovation process was the evolution of the technology applied in the BELPIC solution. Whereas at the onset several of the technologies used for the BELPIC development were relatively immature and had limited availability, today most of these technologies are widely used and mature. For instance, in the late 1990s, the costs of card readers were relatively high, they could only be purchased at a very limited number of companies and the software that supported the card readers suffered from teething problems.[185] Today, many companies sell card readers for much lower prices and their usability has substantially increased.

A third socio-economic change in the Belgian society may be the current economic crisis. Although the opinions of economists on the precise impact of the current economic crisis differ substantially, no one would argue that we have not been in a global economic recession since 2008. In Belgium, for example, the GDP growth in 2008 was 1%, whereas in 2009 it was -3.2% (see figure 7 above).

The large majority of respondents stated that the burst of the internet bubble at the beginning of the 21st century did not have a significant impact. These statements are endorsed by research carried out by the European Commission, which provided an overview of the e-Government budgets in European countries in 2000, 2001 and 2002.[186] The study demonstrates that – despite the burst of the internet bubble – the e-Government budgets of the Belgian government increased between 2000 and 2002, from 776 million euros in 2000, to 857 million in 2001 and 946 million euros in 2002.

However, interviewees also mentioned another socio-economic impact, namely the United States' fight against terrorism. According to several actors, the Belgian government was not willing to hire an American company for the provision of certificates as they were afraid that the United States could violate the privacy of Belgian residents in their fight against terrorism. In addition, the attacks on 11 September affected the specific attributes of the good in the sense that the Belgian government applied enhanced cryptographies.

Some respondents stated that the evolution of the technology applied implied technical changes to the BELPIC solution. One of them, for instance, explained: 'Not all technical developments can be anticipated in such large projects. For instance, in the beginning we had two card readers on two serial ports: these were two separate devices. And as the technology evolved, the USB ports were introduced. Then we had a problem, because USB is one standard and therefore Windows could not handle two different card readers any more.'

185 This was not only the case in Belgium, but also in other countries. See, for instance, Srivastava (2005).

186 European Commission, (2006), 'e-Government Economics Project (eGEP)', Expenditure Study Final Version, Brussels. The only publicly available data on public administration ICT and e-Government expenditure in Europe are those presented in the EITO (European Information Technology Observatory) 2002 edition, which contained a monographic section on e-Government.

Lastly, several interviewees expect that the current economic crisis will have an impact on e-Government budgets since it is likely that the government will face severe budget deficits and will have to make drastic cutbacks. One of the interviewees explained: 'Cost control is one of the most important issues in today's government, and I think this will become an even more important issue in the coming few years because of the economic crisis. […] This will have an effect on the BELPIC solution in the sense that the public administration will try to reduce the costs of the BELPIC. Currently the National Register wants to extend the card's period of validity from five years to 10 years so that the costs of the card can be spread over 10 years instead of five years. Technically this is almost impossible.' However, no sound conclusions can be drawn as to the impact of the current economic crisis on the BELPIC project.

To summarize, it seems that in particular the evolution of the technology applied affected the innovation process in the sense that it raised new technical issues to be solved by the development team. Furthermore it seems that although respondents expect the current economic crisis to impact the dynamics of the subsystem, currently there is no sound evidence of this impact.

6.2.6 Changes in public opinion

Public opinion on the BELPIC solution is most evident in prevailing media, such as national or regional newspapers. Over time, several Belgian newspapers have published articles on the BELPIC project. In 2004, a few months after the launch of the identity card, critical articles about the introduction of the card appeared in some newspapers. The newspaper De Tijd, for instance, reported that the implementation of the electronic identity card would saddle citizens with expenses since the card would cost around 15 euros and the average life of a card would be half as long as the cards in use.[187] In addition, local papers reported on the costs of the electronic identity card. De Gazet van Antwerpen, for instance, wrote about conflicts within the coalition of the Antwerp Council on the price of the identity card.[188]

Between 2005 and 2007, there were not many newspaper articles on the Belgian eID solution. From 2008 on however, the number of articles increased. The newspaper De Morgen published a critical review on the security of the electronic identity card in 2008.[189] The newspaper used an evaluation report by KU Leuven and the Katholieke Hogeschool Sint-Lieven. According to De Morgen, there were videos on the internet that demonstrated how to hack the card's chip. However, one of the authors of the evaluation report denied the existence of those video clips during a radio interview. The responsible Minister, Mr. Dewael, reacted to the article during a press conference and stated that until then no one had been able to hack the electronic identity card. The minister contended that the card is much

187 http://www.zdnet.be/news/38028/elektronische-identiteitskaart-vier-keer-duurder/

188 http://www.gva.be/antwerpen/lier/prijs-elektronische-identiteitskaart-zorgt-voor-onenigheid.aspx, Muncipipalities have the authority to assess the price citizens have to pay for the card

189 http://www.nieuwsblad.be/Article/Detail.aspx?articleID=dmf13062008_003

more secure than bank cards and that the security of the card's technology was being constantly improved.

In 2009, the electronic identity card received some mixed publicity. In March, one of the headlines of the newspaper De Morgen read: 'Electronic identity card scarcely used'. The article not only exposed the card's limited use, it also highlighted its opportunities, as put forward by the secretary of state Vincent Van Quickenborne, who was responsible for administrative burden reduction. In July 2009, De Standaard reported that thousands of citizens had been given compensation for having lost the chip in their electronic identity card and/or because the chip contained false information.[190] The article in De Morgen stated that from 2004 onwards, the government had received 50,600 complaints about the electronic identity card.

Some success stories were also published in Belgian newspapers in 2009. For example, De Standaard published an article on the use of the electronic identity card by the railway company NMBS, which provides travellers with the possibility of using their electronic identity card as public transport card.[191] The article stated that 'the use of the electronic identity card reduces the administrative burden for citizens since travellers can buy a public transport ticket online. The ticket information is automatically downloaded to his/her electronic identity card.'

According to the majority of interviewees, neither the positive nor the negative articles in the newspapers significantly affected the dynamics of the subsystem or the innovation process. One of the interviewees stated: 'There just was not much discussion about the innovation process. The decision makers decided how to implement the BELPIC and subsequently implemented it that way. The concept had been thought through by a select group of persons who were really knowledgeable on eIDM systems.' Another involved person stated: 'There were some negative articles, but these were rearguard actions. Those articles did not have any effect on the innovation process. There were some discussions; there were some questions, but the innovation process unfolded very smoothly.' Another respondent explained: 'The articles which stated that the security of the card is limited are not correct. Maybe it takes nine billion years instead of 10 billions years to hack the card, but it is still one of the most secure cards worldwide. Moreover, the card is so secure that concessions have been made regarding its usability. […] The criticism was purely theoretical; the articles did not affect the innovation process at all.' About the discussions on the costs of the cards, one interviewee stated: 'Today citizens have a card which is more expensive and expires earlier [than the previous card]. But this did not have an effect on the innovation process. This is the way it is, and citizens have to accept it.'

190 http://www.standaard.be/Artikel/Detail.aspx?artikelId=dmf20090713_069
191 http://www.standaard.be/Artikel/Detail.aspx?artikelId=dmf04062009_036

Overall, no evidence has been found that the articles on the BELPIC solution and project in the newspapers have significantly affected the dynamics of the subsystem.

6.2.7 Systemic governing coalitions

During the innovation process, there have been several changes in the governing coalition. Firstly, in 2000 the CEO of Fedict was replaced by a new CEO. The first CEO of Fedict, who was involved in the development of the BELPIC concept, was also CEO of the Crossroads Bank and chairman of the Privacy Commission.[192] Whereas this CEO was very well connected within the BELPIC network, the new CEO had almost no ties with other actors in the subsystem. A second change in systemic governing coalitions was Steria's takeover of Bull N.V.'s ICT department. Bull was assigned the project to build a development structure. And thirdly, during the project the employees of the National Register Department and Fedict who worked on the BELPIC project changed several times. There have been several changes in project manager, policy makers and public relations officials at both the National Register Department and Fedict.

Several respondents remarked that the CEO change at Fedict reduced Fedict's influence the first year after the change, since the new CEO had far fewer connections in the network. One of the involved actors, for instance, stated: 'In the beginning, I had to use Frank Robben's ties because he new all the important players in the field, whereas I hardly knew anyone. I came from outside the public sector. It was very important that I built up a network to increase my influence.'

In addition, the majority of respondents agree that Steria's takeover of Bull's ICT department did not have a substantial impact on the dynamics of the subsystem. One of the actors, for instance, explained: 'It was just a change of name. The same people were on the same project, and so it did not make any difference. Besides, no other company was able to change the infrastructure. The mainframe of the National Register is a Bull mainframe and only a few people know how it works. I have been working on the mainframe for many years and I am one of the few who knows the system.'

Furthermore, interview reports reveal that the personnel changes at the National Register Department and Fedict did not substantially affect the innovation process nor the direction of the innovation. One of the actors, for instance, stated: 'There were many changes within the National Register Department and Fedict. This weakened their position because the knowledge lay in the hands of the suppliers and in the hands of their organisations. However, the top official at the National Register Department did not change and had such significant influence on the process and direction of the innovation that the change of personnel did not

192 See also http://www.senate.be/www/?MIval=/publications/viewTBlokDoc&DATUM='03/20/2003'&TYP=handeen&VOLGNR=2&LANG=nl, and http://www.dekamer.be/doc/CCRA/pdf/50/ac930.pdf

have a real effect. There were just other people who carried out the work ordered by the top official.'

In conclusion, the several changes within the systemic governing coalitions did not substantially impact the direction or outcome of the innovation.

6.2.8 Policy decisions and impacts from other subsystems

Over time, there have been three subsystems, the decisions, policies and/or strategies of which were related to the BEPLIC project, namely the subsystem of local authorities, the (national) political subsystem and the European subsystem.

In terms of the local subsystem, the autonomy of the Belgian local authorities in e-Government policy is generally quite substantial.[193] To increase cooperation, however, the federal government, regions and municipalities came to a co-operation agreement for the development of a common platform for e-Government services in March 2001.[194] The agreement obliges all parties to work together on common e-services that have the same navigation structure. In addition, the parties agreed to increasingly use the same eIDM system and to start using authentic databases. The agreement defines the participating actors' e-Government responsibilities and tasks. A new agreement between the parties was signed in 2003,[195] in which they agreed to (among other things) establish a joint complaints office for citizens and businesses. Yet, interview reports reveal that despite these agreements made on the use of the same (BELPIC) eIDM system, the application of the system by municipalities is still limited since the application of the system implies large-scale modification of back-office systems.

The political subsystem was related to the BELPIC project because several ministers were responsible for e-Government policy and several parliamentarians posed chamber questions on the project. In 1999, the newly appointed Verhofstadt cabinet I published its policy statement,[196] which marked the official political launch of e-Government in Belgium at a federal level.[197] Initially, e-Government was part of a larger government reform, called the Copernicus project.[198] One of the aims of this project was to simplify government processes through the use of ICTs. The Copernicus reform was led by Luc van den Bossche, Minister of Civil Service and Modernisation of the Public Authorities.[199] The responsibility of the development of the BELPIC lay with Antoine Duquesne, Minister of the Interior. On 31 March 2003, the interior minister and civil service minister officially launched

193 Zenc, (2007), 'E-Government in Belgium', Den Haag.
194 http://statbel.fgov.be/nl/ondernemingen/informatiemaatschappij/e_Government/index.jsp
195 http://www.kafka.be/doc/1216040510-2850.pdf
196 Parliamentary proceedings of the Belgian Chamber, Tuesday 12 October – Afternoon Session. http://www.senate.be/www/?MIval=/Registers/ViewReg&COLL=H&PUID=33574986&TID=33606232&POS=47&LANG=nl
197 http://www.fedict.belgium.be/nl/binaries/OECD_e-Government_Studies_-_Belgium%20final%20%5B1%5D_tcm167-27521.pdf
198 http://soc.kuleuven.be/io/ned/persberichten/persio/20051206_perstekst.pdf
199 http://www.politics.be/recensies/597/

the BELPIC.[200] On 12 July 2003, after the elections, Patrick Dewael became the minister of the interior and responsible for the BELPIC until 2008 (in the Verhofstadt II, Verhofstadt III and Leterme I cabinets). After Dewael, two other ministers of the interior have been responsible, namely, Guido de Padt (2008-2009) and Annemie Turtelboom (2009-present). Several parties submitted chamber questions on the BELPIC project. In 2002, the Flemish Green Party posed questions on the tendering procedures of the BELPIC project.[201] The Vlaams Blok posed questions in 2003 to minister Duquesne on delays in the implementation process of the BELPIC. Several questions were posed in 2005 on the implementation of the BELPIC project and the burden for municipalities.[202] In 2009, the Flemish Christian Democrats posed questions on the take-up of the BEPLIC innovation.[203]

The third relevant subsystem is the European Commission. The European Commission has been engaged in eIDM issues since the late 1990s. The Information Society and Media Department had an e-Government unit, the name of which changed to 'ICT for Government and Public Services' in 2007. The unit organised and still regularly organises meetings with the e-Government subgroup, which represents all member states. In addition, the unit established expert groups, one of which focuses on eIDM. At the European level, there were several EU projects and directives on eIDM systems. In 1999, the European directive on electronic signatures went into force.[204] The directive laid down the criteria that form the basis for legal recognition of electronic signatures. In 2004 and 2005, the European MODINIS Project turned its focus, among other things, onto assessing the states quo of eID systems in European member states and the exploration of possible European eID systems.[205] In 2005, IDABC's eID Interoperability for PEGS programme was launched, the objective of which was to analyse the eID and authentication interoperability requirements.[206] In 2008, the STORK project was launched, which aims to establish a European eID Interoperability Platform allowing citizens to establish new e-relations across borders upon presentation of their national eID.[207] In addition, Cap Gemini publishes an annual benchmark on e-Government progress in the European Union member states.

According to the majority of interviewees, local government entities did not have a significant impact on the BELPIC innovation. One of the respondents, for instance, stated: 'Some municipalities were experimenting with their own system, but a large majority did not have an eIDM system in place yet. […] The BELPIC card was mandatory, and the municipalities agreed to increasingly use the eID system.

200 http://www.egov.vic.gov.au/topics-a-z/b/belgium-topics-a-z/e-Government-belgium-archive.html
201 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf
202 CRIV 51 COM 603 18/05/2005, Chambre-3e session de la 51e legislature 2004, Kamer-3e zitting van de 51e zittingsperiode 45, http://www.dekamer.be/doc/ccri/pdf/51/ic603.pdf
203 http://www.senate.be/www/?MIval=/Vragen/SchriftelijkeVraagPrint&LEG=4&NR=3191&LANG=nl
204 http://europa.eu/legislation_summaries/information_society/l24118_en.htm
205 http://ec.europa.eu/information_society/eeurope/2005/all_about/modinis/index_en.htm
206 http://ec.europa.eu/idabc/en/document/6484
207 https://www.eid-stork.eu/index.php?option=com_frontpage&Itemid=1

However, its actual use is limited as it is quite complicated for municipalities to implement the system and they may have other priorities.'

The interview reports reveal that the political subsystem did not have a significant effect on the dynamics of the subsystem. One of the respondents, for instance, explained: 'The influence of parliament members and even ministers is limited. The power is with the administration. Politicians come and go, but top officials, such as the top official of the National Register Department, are here to stay. He has been there for over 30 years, knows all the files, the history of the files, he knows all the people. There were chamber questions but no major political incidents.' One of the interviewees, however, did mention a political impact: 'During the very early phase of the BELPIC, the idea was to integrate the SIS card with the BELPIC solution. But politically this was not feasible. […] I have made several attempts to convince the politicians of the need for integration [of both cards]. The majority of them agreed, but I could not convince the communications consultant of the Verhofstadt cabinet. He told the prime minister that they could not sell this idea to the public. […] Today the government regrets that the cards have not been integrated. […] The true political impact depends on the strength of the politician.'

According to several respondents, the European subsystem has affected the dynamics of the subsystem. A respondent stated: 'Yes the European directive has played a role; this was the initial cause to start the project. […] Now that we have heavily invested in our eIDM system we want to exploit this as much as possible, also in Europe. We have a very prominent role in the STORK project.' Another interviewee: 'Europe was a driver, a motor for the Belgian eID system. European policy is aiming for all European member states to have an electronic identity management system in place, and it should be interoperable at the European level.'

To summarize, it appears that in one instance the political subsystem has affected the innovation process. This intervention has had a significant impact on the attributes of the BELPIC solution (namely, it is not integrated with the SIS card). In addition, it seems that the involvement of one of the university professors in both the European Union and the Belgian federal government has influenced the dynamics of the subsystem and the outcome of the innovation. From the onset, the European e-Signature directive has been a driver for the Belgian eIDM concept.

6.2.9 Conclusions

As regards the parameters of the Advocacy Coalition Framework, it appears that the dynamics of the subsystem, the innovation process and the take-up of the innovation have been affected by the following parameters and events:

- The *specific attributes* of the eID card decreased the willingness of municipalities to use the eID system for online service provision and resulted in limited use by citizens.
- The *lack of resources* affected the dynamics of the subsystem in the sense that there were recurrent negotiations on the allocation of resources. In ad-

dition, the lack of resources influenced the attributes of the innovation as it limited the choice for technological options (e.g. application of biometrics).

- Several *norms and values* have affected the dynamics of the innovation process. Non-intervention principles resulted in limited cooperation between ministries and the fear of loss of face led to limited willingness of involved actors to change strategies. In addition, new public management principles were important for the initiation and shape of the BELPIC solution.
- The *legal framework* resulted in limited take-up by private sector parties (as use is restricted), provided nationwide take-up of the card by municipalities and citizens (as it was obligatory), but did not affect the use of the card for online identification purposes by municipalities and citizens.
- In particular the *evolution of the technology* applied affected the innovation process in the sense that it raised new technical issues that needed to be solved by the development team. Furthermore, there is presently no sound evidence that the current economic crisis will have an impact on the innovation.
- No evidence has been found that *public opinion* has significantly affected the dynamics of the subsystem, the innovation outcome or impact.
- The several changes within the *systemic governing coalitions* did not substantially impact the direction or outcome of the innovation.
- In one instance the *political subsystem* affected the innovation process. This intervention had a significant impact on the attributes of the BELPIC solution (namely, it is not integrated with the SIS card). In addition, the involvement of one of the university professors in the European subsystem influenced the dynamics of the subsystem and the outcome of the innovation.

6.3 SOCIAL CAPITAL VARIABLES

This section draws conclusions for each of the social capital variables regarding the influence of social capital characteristics on the dynamics of the subsystem and subsequently on the joint, technological innovation process. Each sub-section concludes with an assessment of the influence of the specific variable on the innovation process, outcome and/or impact.

6.3.1 Openness versus group closure

Interview reports demonstrate that during the stage that defines the BELPIC solution's features, the subsystem was relatively closed. One of the participating actors, for instance, stated: 'Only five people were involved at the development stage of the technical and legal specifications. The decision makers knew the experts very well and knew that their visions on the technology were in line. This really accelerated the process.' During the BELPIC concept's first development phase, the group of people involved was small, the network dense and there was a high level of agreement on the goal and requirements of the innovation. In addition, interviews reveal that the decision makers of the National Register Department and the Crossroads Bank of the Social Security were determined (and had the

power) to realise their preferred concept. Once they had decided on the technical specifications of the solution, their willingness to modify the initial concept was limited. After the technical and legal specifications were described in a report by KU Leuven, one of the decision makers hired a consultancy company to carry out a feasibility study to examine the tenability of the concept and to provide them with recommendations for modifications to the concept.[208]

However, one of the involved persons stated the following about this feasibility study: 'From the kick-off meeting on it was clear to all of us that the only thing the project commissioners wanted was a confirmation of the concept developed by KU Leuven. They did not want a critical review of the system but ammunition to convince the Cabinet of Ministers to adopt the system.' This determination of decision makers to implement their concept and to achieve progress in the implementation has been confirmed by another interviewee, who stated: 'The positive aspect of such a strong control over the outcome of the innovation and limited willingness to change strategies is that it advances the innovation process in the sense that it speeds up progress. However, over time the technology evolved, and new insights emerged which were neglected by the decision makers. They perceive a change to the concept as a loss of face. What they might do in such a situation is wait for a strategic moment to introduce the new technology, which can be presented as the new version and not a replacement of the innovation.'

Elements of group closure were also present in the development phase. One of the interviewees stated: 'The administration assigns the project to the party that is most able to support the goals of the administration. Of course they have to comply with formal rules for open tendering. However, one can choose to publish the call in such a way that only one party can actually find this publication. So the administration will have formally published the call, and at the same time they can hire the company they want to hire.' Minister Duquesne reported the following during a chamber meeting 'Parts 1 and 2 of the contract were awarded to the company Bull N.V., who worked with the following sub contractors: Belgacom, Telindus, Cevi, Ciger and Cipal. Bull was the only party to submit a proposal.'[209] Other interviewees confirm Bull N.V.'s preferred position. One of them, for instance, remarked: 'Bull had built the mainframe of the National Register and therefore had the appropriate knowledge to modify the infrastructure. The National Register just wanted to hire Bull, and so they did.'

Group closure effects can also be found in the pilot phase. Several pilot municipalities had crucial criticisms of the system, questioned the feasibility of the national roll-out, and yet the National Register Department concluded the pilot phase with a positive evaluation (document is not available to the public). According to several actors involved, this evaluation was not based on the opinion of the municipalities or assessed by an independent external organisation. One of them, for instance, stated: 'To be honest, there has not been a sound evaluation of

208 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf
209 http://www.dekamer.be/doc/CCRI/pdf/50/ic647.pdf

the pilot. Municipalities have not been approached for an evaluation; no external party has been contracted for the evaluation. The National Register Department itself decided that the evaluation was positive and communicated this to the ministers. Their most important aim was that the cabinet would decide to generally implement the electronic identity card by Royal Decree.'

In conclusion, group closure mechanisms in the design, early development and pilot phase have significantly affected the innovation process in the sense that the federal government determined to a large degree the attributes of the system. In addition, the features of the BELPIC solution do not seem to fully match the demand of the service providers and end-users. Increased involvement of service providers and (representatives of) users in the very beginning of the project might have increased their willingness to adopt the BELPIC solution.

6.3.2 Strength of the ties

Several respondents indicated that strong ties affected the early development of the BELPIC. One of them, for instance, explained that 'strong ties have played a dominant role in the formation of the team that defined the features and requirements of the solution: '[The top official] knew [the law professor and key advisor] very well. They established ICRI together in the 1980s. [The top official] still lectures at ICRI. […] The fact that people know each other smoothes the process. The people involved knew each other's opinions, interests and behaviour. […] The top officials chose the people in their team who fitted their interests and ambitions.' Various interview reports reveal that during the early development of the BELPIC solution, strong and medium ties were also used to (attempt to) influence opinions. One actor, for instance, stated: 'At the very beginning of the BELPIC project, the idea was to integrate the SIS card with the BELPIC solution. But politically this was not feasible. […] I have made several attempts to convince the politicians of the need for integration [of both cards]. The majority of them agreed, but I could not convince the communications consultant of the Verhofstadt cabinet. He told the prime minister that they could not sell this idea to the public because of privacy issues […].'

Furthermore, several respondents reported that strong and medium ties were used to involve municipalities in the pilot phase of the project. One of the respondents, for instance, explained: 'Behind the scenes, the National Register Department has used existing strong ties to get municipalities engaged in the pilot. Municipalities were not very willing to participate because they knew that they would face important challenges, such as teething problems in the system. […] Political ties have been used to involve municipalities. An advantage for the National Register Department in using these ties is that they can closely monitor the process and make an appeal to the loyalty of their connections in case of difficulties. […] Of course, other factors have played a role too. It was important to achieve parity, to have an equal representation of the French, Flemish and German-speaking areas, small and larger municipalities and the various regions. In addition, it was important to select those municipalities whose ambitions

dovetailed with the BELPIC roll-out.' Another respondent stated: 'The reason our city joined [the pilot project] is quite simple. Our mayor has been minister of the interior for years and knew him [top official] very well. These people can approach each other quite easily. In addition, he [top official] already had contacts at the KU Leuven and knew that the university wanted to be the shining light of knowledge in Belgium. He succeeded in convincing our mayor to join up.'

Various respondents provided examples of cases where strong ties were used to solve problems during the project. One of the actors, for instance, argued: 'My network is very important to me. To be honest I do not believe in formal structures. If there is a problem, one first discusses the problem bilaterally with everyone until he or she has reached some degree of consensus. Of course, this holds true for the BELPIC project as well. […] When everyone informally agrees, a formal decision can be made. […] It is essential that you know who you can approach. […] The person is the most important thing, not their position. Informal agreements are very important. They are made during lunchtime, informally, without minutes and without a third person. Trust is very important in these contacts.' Furthermore, there have been several examples where problems have escalated through existing, mostly hierarchical ties. One of the involved actors explained: 'There was this discussion between Fedict and the National Register Department on the question of whether the address [of a citizen] should be printed on the card. Fedict wanted the address printed on the card, and Vanneste wanted it on the card's chip. This discussion took place one week before the launch, so we had to come to an agreement. I called my minister and he came to an agreement with the minister Vanneste worked with.'

Finally, several respondents stated that they used their strong ties to form a coalition. One example is between the suppliers. One of the involved actors stated: 'Every time we have a meeting with the government we have a lunch in advance to prepare all discussions points. It is important that we agree on crucial issues so that we can take a stand during our discussions with the government.'

Overall, both weak and strong interpersonal ties affected the joint innovation process in the sense that these ties were used to influence opinions, access strategic information, involve parties and/or solve problems and build coalitions.

6.3.3 Heterogeneity of the network

According to several respondents, the heterogeneity of the network was particularly limited during the early stages of the innovation. A former Fedict employee explained: 'Although the universities of Namur and Liege also have top experts on eIDM systems, these experts were not involved in the development of the eID concept. KU Leuven participated because government practitioners had strong ties with KU Leuven experts.' In addition, no service providers were involved in the design phase who could have promoted the interests and demand of the service providers. One of the interviewees stated about the limited involvement of service providers: 'The municipalities were obliged to join up. They were the identity

card issuers, and the paper-based card was simply replaced by the digital card. However, other service providers, such as other ministries, were not obliged to use the eID system developed by the National Register Department. […] Although the characteristics of the system did not play a role for the municipalities [as they were forced to adopt it] the features did play a role for other service providers. Because the system is quite complicated to implement, their willingness to use it is limited.'

In conclusion, the homogeneity of the group involved in the design phase of the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.

6.3.4 Broker's position

Strategic positions within the network have played a role in several instances. One of the actors who had a strategic position was the CEO of the Crossroads Bank. He was also chair of the Privacy Commission, (for some time) CEO of Fedict and lecturer at ICRI. One of the interviewees had the following to say about the process of building a legal framework and the position of the CEO of Crossroads Bank. 'He [top official] was not only the CEO of Fedict and the Crossroads Bank, but was also the chairman of the Privacy Commission. He knew the views held by members of the Privacy Commission and could anticipate those views by addressing all the issues which he thought would be raised in advance.' Another interviewee stated the following: 'Of course the fact that he [top official] was [involved in the group which prepared the concept and] the chairman of the privacy committee had an effect on a fast adoption of new legislation. As I stated before: as everyone had their own competences, there was no conflict between design and legislation.'

Low connectivity also appears to have had an impact on the dynamics of the subsystem. At a certain point in time, the CEO of Fedict was replaced by a new CEO. Several interviewees felt that the new CEO's lack of a strong network in the public sector (since he came from the private sector) decreased the influence of Fedict for some time. The influence increased as the new CEO built up a network. One of the interviewees had the following to say about the new CEO's ties: 'He [new CEO Fedict] and his employees were quite new to the network; they did not have many ties within the network. He [new CEO] often had to use my connections to achieve his goals. I have been in the Privacy Commission for 17 years and have dealt with many files. [New CEO] does not have a network in the Privacy Commission and asked me to bring him into contact with relevant persons.' One of the new employees at Fedict explained: 'I was totally new in the network and I became responsible for the eID project. That was quite a challenge. The people from the National Register Department acted like "why are you here?" The first meetings with the National Register were very difficult. I did not speak their language; I did not know the informal positions of all these people, and whether their opinions were important. It took some time for me to consolidate my position and gain influence.'

Also notable are the changes of positions of central persons within the network. One of the interviewees explained that the changing of position of a central person affects the positions of the remaining actors within the subsystem: 'What is important to know is that most ministers have been civil servants, and most of the top officials eventually become ministers. It is quite a closed network. Ministers are often former colleagues. […] After the elections in 1999, Dehaene left, and the network changed. This directly influenced my position as I could no longer influence the policy of other departments. Dehaene's position changed, and consequently mine did too. He and other members of the cabinet were given new positions, in the private sector, for example. The shift of positions also directly influenced my network in the sense that my influence in the government network decreased, while it increased in the private sector.'

In conclusion, actors with a strategic position in the network were in a better position to influence the direction of the innovation.

6.3.5 Interpersonal trust

The large majority of interview reports reveal that the lack of interpersonal trust affected the innovation process in the sense that the cooperation between organisations was difficult and cumbersome. One of the respondents, for instance, stated: 'I do not trust him [top administrator] at all. He can act in very unexpected ways and displays opportunistic behaviour. […] As he has a severe lack of resources he has tripled the price for database consultation. He tried to triple the price without consultation. One day, the cabinet made this decision following the elections, when there was a power vacuum. Now he sends me invoices for 2.5 to 5 million euros, even though I can prove that the register can function on only a fraction of these costs. […] Unfortunately, he is not open to positive cooperation. The Crossroads Bank, for example, could substantially save costs by using his infrastructure – which would save tax money – but he does not want to cooperate.' According to several interviewees, this lack of trust also hampered the discussions about the integration of the SIS and the BELPIC card.

In various cases where there was a lack of trust, contracts were used to create a stable situation. One of the involved persons, for instance, explained: 'After a year of cooperation, we established a formal co-existence agreement. We made a detailed description of the areas the Crossroads Bank would cover and the areas Fedict would cover. We did this in order to prevent a situation in which we would encroach on each other's territory. I, for instance, got the social security sector, while he [top administrator] got the economic sector. We distributed this agreement to every minister so that they could not play us off against each other. Now we have a very strong cooperation.'

The interview reports indicate that the level of trust depends, among other things, on the extent to which values are shared between persons. One of the respondents, for instance, argued: 'I have more in common with [top official X] than with [top official Y], and therefore my trust in [X] is higher. [X] and I are both

quite result- and practice-oriented, whereas [Y] has values such as loyalty and hierarchy. […] As I understand the reasoning of [X], I can predict his actions and trust that the innovation will go in a certain direction.' In addition, several concrete situations in the BELPIC project show that interdependencies can compensate for trust. One of the respondents, for instance, stated: 'Of course [the top officials] trusted us. We were highly dependent on them. If we would have acted in an opportunistic way, we would not have been assigned any new projects. Both [top officials] were very important for us, they were high-level clients and our entrance into the e-Government market.' On the other hand, trust can also emerge from independency. One of the interviewees stated: 'The commissioners of the project trusted us because we were an independent party, because we did not have any specific interests. Our department at the university has a reputation of being independent, which can create trust. […] They will hire you if they want an independent audit of a situation and may not hire you if they want a certain outcome.'

Several citations by respondents point to the fact that the level of trust also depends on people's personal skills and characteristics. The following statement attests to this: 'A strong minister like Jean-Luc Dehaene will be able to defend a certain viewpoint. However, when I have to deal with a weak minister who changes opinion every day, I will give him the least information possible and will just try to realise the project. When I'm facing a strong minister, I will exchange views and explore the counter arguments of the opposition parties. As a top official, you need a minister who is autonomous in his decisions, does not change as a result of each incident and has a stable policy. A strong minister can escalate issues and commands respect.' Another interviewee stated: 'I have been working as a researcher in this area for years and have built up a body of knowledge on this subject. The government has confidence in me as an expert. They know that I am aware of the latest developments.'

Finally, various respondents explained that more trust or compensation of trust is needed in cases where the interests at stake are high. One of them, for instance, argued: 'Consolidating [our city] posed a serious risk in the sense that there was a real possibility that we would not be able to provide citizens with a new ID card, which could generate negative publicity and damage the reputation of the politicians. […] The fact that our mayor personally knew the top officials of the federal government helped to overcome reluctance on our side. Our mayor trusted the top officials of the federal government to achieve this goal and knew that he could use his ties in case of problems.' Another interviewee had the following to say about the political environment, risks and trust: 'In politics a minor issue can provoke a major discussion. So you have to be very careful when acting in the political domain. In these risky environments, trust is needed in order to innovate. […] With innovations, the outcome is unsure and thus trust is needed.'

To summarize, low levels of interpersonal trust hampered the innovation process but were also compensated by hierarchy, contracts or interdependencies. The presence or non-presence of interpersonal trust affected the joint innovation process in the sense that actors were more willing to take risks.

6.3.6 Conclusions

It seems that the characteristics and dynamics of the subsystem significantly influenced the joint technological innovation.

- *Group closure* affected the joint innovation process in the sense that group closure mechanisms resulted in the limited involvement of actors outside the group, the limited promotion of their interests, and it therefore also demands from these actors a limited willingness to join up in later phases.
- Both *weak and strong interpersonal ties* affected the joint innovation process in the sense that these ties were used to influence opinions, access strategic information, involve parties and/or solve problems and build coalitions.
- The *homogeneity* of the group involved in the design phase of the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.
- Actors with a *strategic position* in the network were in a better position to influence the direction of the innovation.
- The *low level of interpersonal trust* hampered the innovation process but was also compensated by hierarchy, contracts or interdependencies. The presence or absence of interpersonal trust affected the joint innovation process in the sense that actors were more willing to take risks.

6.4 OVERALL CONCLUSIONS

Regarding the parameters of the framework used in this research, it appears that the following aspects have influenced the dynamics of the subsystem, the innovation outcome and/or impact:

- The *specific attributes of the eID card* decreased the willingness of municipalities to use the eID system for online service provision and resulted in limited use by citizens.
- The *lack of resources* affected the dynamics of the subsystem in the sense that there were recurrent negotiations on the allocation of resources. In addition, the lack of resources influenced the attributes of the innovation as it limited the choice for technological options (e.g. application of biometrics).
- Several *norms and values* affected the dynamics of the innovation process. Non-intervention principles resulted in limited cooperation between ministries, and the fear of losing face led to the limited willingness of involved actors to change strategies. In addition, new public management principles were important for the initiation and shape of the BELPIC solution.
- The *legal framework* resulted in limited take-up by private sector parties (as use is restricted), provided a nationwide take-up of the card by municipalities and citizens (as it was obligatory), but did not affect the use of the card for online identification purposes by municipalities and citizens.
- In particular the *evolution of the technology* applied affected the innovation process in the sense that it raised new technical issues that needed to be solved by the development team. Furthermore, there is no sound evidence that the current economic crisis will have an impact on the innovation.

- No evidence has been found that *public opinion* has significantly affected the dynamics of the subsystem, the innovation outcome or impact.
- The several changes within the *systemic governing coalitions* did not substantially impact the direction or outcome of the innovation.
- In one instance the *political subsystem* affected the innovation process. This intervention had a significant impact on the attributes of the BELPIC solution (namely, it is not integrated with the SIS card). In addition, the involvement of one of the university professors in the European subsystem influenced the dynamics of the subsystem and the outcome of the innovation.
- *Group closure* affected the joint innovation process in the sense that group closure mechanisms resulted in the limited involvement of actors outside the group, the limited promotion of their interests, and it therefore also demands from these actors a limited willingness to join up in later phases.
- Both *weak and strong interpersonal ties* affected the joint innovation process in the sense that these ties were used to influence opinions, access strategic information, involve parties and/or solve problems and build coalitions.
- The *homogeneity* of the group involved in the design phase of the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.
- Actors with a *strategic position in the network* were in a better position to influence the direction of the innovation.
- *Low levels of interpersonal trust* hampered the innovation process but were also compensated by hierarchy, contracts or interdependencies. The presence or absence of interpersonal trust affected the joint innovation process in the sense that actors were more willing to take risks.

7

The Finnish VETUMA gateway

This seventh chapter examines the third case of a joint development of an eIDM system, namely the VETUMA solution developed by Finnish government entities. As described in the last section of the fourth, methodological, chapter, the empirical chapters consist of four main parts. The introductory section chronologically describes the innovation process along the innovation stages (initiation, development, implementation and diffusion). Conclusions are drawn regarding the application of strategies, decision making and the outcome and impact of the innovation. The second section examines evidence found regarding the impact of Advocacy Coalition Framework parameters and events. Each sub-section draws a conclusion about to the specific effects of the variable. The influence of social capital variables are explored in the third section. For the five dominant network and tie characteristics (network closure, strength of ties, heterogeneity, broker's position and levels of trust) an overview is provided of the perceived impact by involved actors. The sub-sections of this third section conclude with an overview of the key impacts of the specific variable. The fourth (and last) section draws conclusions about the influence of the framework variables.[210]

7.1 INTRODUCTION

This first section describes the successive innovation stages of the VETUMA development. For each innovation stage (initiation, development, implementation and diffusion), the most important actors involved, strategies applied and decisions made, are outlined. The last part of this section provides a summary of the key actors, strategies and decisions, and provides insight into the outputs and impacts of the innovation process.

210 All websites mentioned in this chapter have been accessed between September and December 2009.

7.1.1 Initiation phase

In 2002, the idea to create an eIDM system was developed by two government practitioners from the municipalities of Vantaa[211] and Espoo.[212] One of the involved actors stated: 'The actual impetus for the eID project was another project, which started in 2001. The city of Espoo had a large-scale project, called eEspoo, which aimed to deliver electronic services to citizens. […] We wanted to implement some healthcare and social services, which required a form of identification and authentication. […] We already had a close cooperation with the city of Vantaa; we had several e-Services commonly developed and we had similar needs.' Another involved person explained: 'I think the need for an eIDM system was mentioned during a meeting with Simo [government practitioner of Espoo]. There was some other project we [Vantaa and Espoo] were both in, and we noticed that in many projects there was a need for identification. […] We came to the conclusion that every municipality would need an eIDM system and that we could play a role in the development of a nationwide solution.'

The government practitioners of Espoo and Vantaa decided in 2003 to also involve the cities Helsinki[213] and Kauniainen.[214] One of the respondents stated: 'We saw that it would be best if the [eIDM] solution would become a national solution and hence we had to cooperate with other cities. In Finland the central government does not play a very strong role in e-Government policy at the municipal level. We [municipalities] are very autonomous, and we realised that we would not get any strict rules or clear directions from the central government.' And a government practitioner from Helsinki involved in the process stated: 'I think I was called by Anne [government practitioner of Vantaa]. I knew her personally. Of course we were interested; we also needed an eIDM system.' The informal project group not only decided to involve other municipalities, but also the central government. One of the initiators: 'We realised that if we would build a national eIDM system, for all municipalities, we needed some kind of backing from the central government both financially and in terms of support so that our solution would be a national solution. So we decided to contact JUHTA[215] [a public administration recommendation council established by the Ministry of the Interior].'[216]

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211 http://www.vantaa.fi/i_etusivu.asp?path=1

212 http://www.espoo.fi/

213 http://www.hel.fi/wps/portal/Helsinki_en?WCM_GLOBAL_CONTEXT=/Helsinki/en/Etusivu

214 http://www.kauniainen.fi/

215 http://www.jhs-suositukset.fi/web/guest/jhs

216 As it says on their website, 'The Advisory Committee on Information Management in Public Administration, JUHTA, has been set up at the Ministry of the Interior to promote cooperation in information management between the State and the municipalities. The Committee plans cooperation in information management, makes reports and studies, and draws up recommendations for the public administration.' JUHTA is responsible for coordinating the development of information technology, information management and electronic services in the central and local government, promoting the use of ICTs in the public administration as well as setting standards and drawing up guidelines and administrative principles in its area of competence ('JHS recommendations': Reference Architecture for Online Services, Public Administration interfaces for information management, Finnish metadata standard, XML standards, etc.).'

In addition, the founding members decided to involve the Information Society programme of the Prime Minister's Office, which was established after the parliamentary elections of March 2003.[217] A respondent from the Ministry of the Interior: 'I was on the train from Tampere and my phone rang. It was Anne. I had known her for many years. She told me about their idea and asked if the central government would like to be a part of this. I found it a perfect idea. […] I contacted Katrina [from the Information Society Programme] to get her involved. I was a member of the Information Society Programme.' And an employee of JUHTA stated about their involvement: 'JUHTA's aim was to enhance ICT cooperation between municipalities and between municipalities and the state. Of course, ultimately, the tax payers benefit from improved cooperation. The project dovetailed perfectly with JUHTA's mission.'

2003 saw the enactment of both the Act on Electronic Services and Communication in the Public Sector[218] and the Act on Electronic Signatures.[219] The objective of the Act on Electronic Services and Communication in the Public Sector is to improve efficiency and speed of the services and communication, as well as information security in the administration, in the courts, other legal entities and in the enforcement authorities by promoting the use of electronic data transmission.[220] It contains provisions on the rights, duties and responsibilities of the authorities and their customers in the context of electronic services and communication. The general purpose of the Act on Electronic Signatures is to promote the use of electronic signatures and the related supply of products and services. In addition, the act aims to enhance information security and data protection in the field of electronic commerce and electronic services.[221]

7.1.2 Development phase

In 2004, a steering group and project group were established. The management group included representatives of the Ministry of the Interior, Ministry of Finance, the four initiating municipalities (Espoo, Vantaa, Helsinki and Kauniainen) and the Information Society Programme. The project group contained the municipali-

217 The Finnish Information Society Programme to promote information society in Finland was initiated in September 2003. The Information Society Programme focused on benefitting from the opportunities offered by the information society. The aim of the programme was to boost competitiveness and productivity, to promote social and regional equality and to improve citizens´ well-being and quality of life through effective use of ICTs. The Information Society Programme consisted of eight sub-sectors, among which electronic services in public administration. Management of the Programme Coordinating the Programme rests with the Prime Ministers´ Office. The Prime Minister leads the Ministerial Group (Prime Minister, Minister of Transport and Communication, Minister of Education, Minister of Finance, Minister of Defence). The Programme Director's Office has operational responsibility for the implementation of the programme and is assisted by a steering committee of different ministries and local authorities. http://www.tietoyhteiskuntaohjelma.fi/en_GB/index.html

218 http://www.finlex.fi/pdf/saadkaan/E0030013.PDF

219 http://www.finlex.fi/en/laki/kaannokset/2003/en20030014.pdf

220 http://ec.europa.eu/idabc/servlets/Doc?id=28744

221 http://ec.europa.eu/idabc/servlets/Doc?id=28744

ties, and the overall project management was in the hands of the city of Vantaa. A JUHTA representative acted as project secretary for both groups. One of the project group's key activities was the definition of tender specifications for the procurement of the eIDM system. A strategic document by the project group, published in February 2005,[222] defined one of the leading requirements, namely that the VETUMA platform should support several electronic identification systems to provide services to citizens, such as the FINEID card, bank solutions (such as TUPAS), mobile and username and password authentication. Depending on the security level needed, a specific electronic identification system could be applied (stronger or weaker authentication).

There were some important discussions within the project and management group during the development phase. One discussion concerned a project initiated in 2004 by the Finnish Tax Administration, Ministry of Labour and the Social Insurance Institution of Finland[223] – called KATSO[224] – to develop an electronic identification platform. KATSO's project goal was highly similar to that of the VETUMA project, namely to develop an eIDM platform that uses several electronic identification solutions (such as the national smart cards and net bank identification) to provide online services to citizens.[225] In 2005, members of both projects held a meeting to explore a possible cooperation. At the time, the KATSO project had almost completed the procurement process.[226] Several interviewees stated that although the objectives of the projects were comparable, it was not possible to cooperate due to decisions made in the KATSO tendering process. One of the respondents, for instance, explained: 'Before VETUMA, there was the KATVE consortium, which built the KATSO solution for the government. It was not possible for the municipalities to join up as only the organisations mentioned in the tender could use the solution.'

Another important issue in the project and management group was the VETUMA tendering procedure. If an ICT system is to be used by several organisations, Finnish law required these organisations to jointly submit a call for tenders.[227] For central government, Hansel Ltd[228] is the central procurement unit as defined in the Public Procurement Act. The Hansel office is responsible for carrying out the tendering processes related to state procurement operations and for making and maintaining related contracts. In 2005, however, there was not a central procurement unit for municipalities. Several respondents have stated that this was one of

222 Internal document of the cities of Espoo, Vantaa, Helsinki and Kauniainen; Lindblad-Ahonen, A. and T. Karakorpi, report on the governance and funding of VETUMA, February 2005, section 2.2.

223 http://ec.europa.eu/information_society/activities/ict_psp/documents/eid_good_practices_modinis_study.pdf

224 https://www.tunnistus.fi/, Katso is an identification service for web services of member organisations.

225 http://cis.ier.hit-u.ac.jp/Japanese/society/conference1001/kiiski-paper.pdf

226 http://www.projectliberty.org/liberty/content/download/1008/7061/file/Nat_Brd_Taxes_Finland.pdf

227 http://www.finlex.fi/fi/laki/kaannokset/1992/en19921505.pdf

228 http://www.hansel.fi/en/activities/publicprocurement

the problems the management and project group faced. One respondent: 'Back then, we did not have a central procurement office, so we decided that Helsinki could have this role. I [government practitioner of Helsinki] sent a letter of intent to all municipalities, asking if they were interested in joining up. Around 60 municipalities said that they were, and we included them in the contract.' And someone else remarked: 'For the municipalities, that [procurement] was a problem. We had to ask every municipality to join the bid. If they wanted to join up they had to sign a letter of attorney that we could bid for them.' Eventually, Helsinki was able to publish the bid and in October 2005, Fujitsu was awarded the project.[229,230]

Fujitsu developed the first version of VETUMA, and the first pilots were launched in the spring of 2006. Various respondents stated that there were not many problems during the technical development of the system. One of them stated: 'The technical development went quite smoothly. The technical team did not face any severe technical problems. Some [infrastructural] problems were raised much later in the implementation phase, for instance the cumbersome process for citizens to obtain the mobile identification solution.' The first version was tested in a pilot group consisting of the municipalities of Oulu, Turku, Tampere, Pori and Mikkeli. Based on the evaluation, the system was improved, and its first services were ready for implementation.

7.1.3 Implementation phase

One of the first electronic services that made use of the VETUMA platform was a payment system at municipal tennis centre in Helsinki in 2006.[231] An involved government practitioner stated: 'At the time, we already had some services that were ready to go into production. One of these services was in our Sports Department, for the online reservation and payment of tennis courts.' Soon other municipalities started to use VETUMA to provide online services to its citizens. Fujitsu presented – in cooperation with the project group – the VETUMA solution during several municipal gatherings in Finland.[232] In addition, the project group launched a website providing municipalities with information on how to implement and use the VETUMA solution.[233] The website contained background documentation, information on the technical interface and a toolkit to integrate VETUMA into existing communication applications. Fujitsu taught municipalities how to use VETUMA in training sessions.

Meanwhile, the project and management group held discussions on the structural ownership and financing of VETUMA. In the development and implementa-

229 http://www.fujitsu.com/fi/news/pr/20051214.html
230 See PowerPoint presentation by Tapani Puisto, Government IT-service center, State Treasury, page 2.
231 https://asp.innofactor.com/hki-liikunta/EnrolmentClient/calendarselect.aspx
232 See, for instance, http://www.huoltovarmuus.fi/documents/7/Verkkotunnistautuminen_Jukka%20Keso.pdf
233 http://www.suomi.fi/suomifi/laatuaverkkoon/asiointi_ja_lomakkeet/sahkoinen_asiointi/verkkotunnistaminen_ja_maksaminen/

tion phase, the representative of the Information Society Programme had stated that the central government was willing to pay a substantial part of VETUMA's development and implementation, but this programme would end in 2007.[234] One of the respondents: 'The central government was already involved, but we [the founding municipalities] did not know how much they wanted to invest in the system.' And a representative of the Ministry of the Interior: 'The Information Society Programme invested around 400,000 euros, but that programme was destined to end in 2007. So the question was raised who would take over the ownership and continue to fund the VETUMA solution.' Another actor: 'The Information Society Programme was a temporary programme, just the first period of Vanhanen cabinet[235] and lasted for four years. The management group had to decide what to do with the VETUMA project. It was decided during a meeting attended by the Information Society Programme, the Ministry of Finance and the State Treasury that valt-IT, a division of the Ministry of Finance, would own the project.'

In 2006, FICOM, a Finnish organisation for telecom operators, started to develop a mobile ID that could be applied through the VETUMA platform. Several systems were already integrated into VETUMA, such as the FINEID card identification, the TUPAS identification service of the banks, and the next step would be to integrate mobile identification into the platform. However, interview reports reveal that the FICOM implementation team faced several problems. One of the involved actors, for instance, explained: 'We made a great effort to launch the mobile application, but the threshold for citizens to obtain it remained too high. For citizens it was a very cumbersome process. First you would have to go to the population office to get a certification for mobile identification. Then you had to go to the telecom operator to get the SIM card, which is PKI-based and makes use of the certificate. After that, you had to go to the police office for registration. I still do not understand why people could not register at the population office. Anyway, the process was too much of a burden for citizens, and the take-up was low.'

In 2007, 15 government entities offered services[236] for using the VETUMA platform, including:[237]

- City of Helsinki, Sports Department, healthcare booking
- City of Turku, event calendar, healthcare booking
- City of Vantaa, e-Form services
- City of Jyväskylä, booking of facilities
- District Hospital of Helsinki (HUS), e-Form service
- The Finnish National Board of Education, online application for education
- The Finnish National Gallery, web shop
- State Treasury, online recruitment for central government vacancies

234 http://www.tietoyhteiskuntaohjelma.fi/en_GB/
235 http://en.wikipedia.org/wiki/Matti_Vanhanen%27s_first_cabinet
236 See http://www.vtv.fi/files/145/161_2008_Tunnistuspalvelut_NETTI.pdf
237 http://www.suomi.fi/suomifi/qualitytotheweb/e-Services_and_forms/e-Services/vetuma_service/vetuma_service/VETUMA_service.pdf

A statistical analysis by the Ministry of Finance showed that in 2007 over 80% of the citizens who used the VETUMA platform to obtain a government service used it in combination with the banks' TUPAS online identification solution.[238]

7.1.4 Diffusion phase

In January 2008, 34 government organisations had joined the VETUMA project.[239] The Ministry of Finance's valt-IT unit, together with Fujitsu, continued to present the solution during seminars across Finland, to stimulate government organisations to join. An employee of the valt-IT unit of the Ministry of Finance explained: 'We provided information to government organisations through the website, but we also had large-scale conferences. These conferences were held twice a year, and every year one of the subjects was VETUMA. We presented the VETUMA solution and tried to convince government organisations to start using it.' Another respondent: 'Of course we struggled with the question how to get government organisations involved, how to get them to adopt the solution. What really worked was that we said in our presentations that until the end of the year joining would be for free and that next year service providers would have to pay a joining-up fee of 2,400 euros. Like a temporary offer. We extended the special offer several times. I guess the joining-up fee is still paid by the central government. But, anyway, it worked.'

On 16 January 2008, the National Audit Office published a critical report on electronic identification solutions developed by the Finnish government.[240] The report stated that the development of online identification and authentication for services to citizens was inefficient due to a lack of central coordination and the presence of competition between several systems (e.g. VETUMA and KATSO). The report concluded that the development and operating costs of the identification services, covered by the audit, amounted to 40 million euros from 1999 to 2007, and that more efficient central coordination could have reduced this expenditure. According to the National Audit Office, a more uniform and streamlined operation and monitoring of online identity management is needed. In its report, the National Audit Office was also critical of the investments made in the FINEID card, the use and subsequent take-up of which was low compared to the TUPAS solution offered by the banks.

The ownership of the VETUMA project moved in 2009 from the valt-IT unit of the Ministry of Finance to the State IT Service Centre of the State Treasury.[241] The State IT Centre manages government-wide electronic services for municipalities, including the VETUMA platform. On 10 June 2009, a new public tendering pro-

238 http://b2cpro.vtt.fi/documents/seminar/b2c-pro-seminaari-mikkola.pdf
239 http://www.fujitsu.com/fi/services/sahkoinenasiointi/
240 http://www.vtv.fi/files/135/1622008_Metsahallitus_NETTI.pdf
241 http://www.statskontoret.fi/public/Default.aspx?culture=sv-FI&contentlan=3&nodeid=15808, see http://www.ica-it.org/conf43/docs/Conf43_The_Status_of_ICT_in_Governments_2009.pdf, page 4

cedure was published for the further development of VETUMA.[242] Plans called the VETUMA service to be made interoperable with other identity services (e.g. KATSO).[243] The project was awarded to Fujitsu.[244] According to the plans of the Finnish government, the VETUMA service will become the unique gateway for citizens to securely access e-Services. To achieve streamlined identification across all government organisations, in 2009 the Ministry of Finance drafted the 'Security Levels Programme' in order to set up common IT security requirements and controls for all government agencies and service providers.[245] The Security Levels Programme may strongly affect the eIDM strategies and landscape in Finland as all organisations will have to comply with these requirements starting in 2011.[246]

On 1 September 2009, the Act on Electronic Authentication and Signatures came into force.[247] The objective of the act is to create a set of common rules in order to provide strong electronic identification services and to promote the use of electronic signatures. All service providers offering eIDM services that are branded as 'strong' will fall under the supervision and control of the new regulations.[248] Since the TUPAS solution is a paper-based token, and subsequently the security level is rather low, a new version of the TUPAS service is being considered today. In addition, a new Population Register Act, the amendments to the Passport Act and a totally new Identity Act will come into force in 2010.[249] Most of these changes are not currently implemented in practice. Mobile PKI services will most likely appear soon on the Finnish eIDM market, as well as Open ID. The future of the FINEID card is still unclear. By the end of December 2009, Citizen Certificates had been issued to a total of 286,000 people.[250,251] In March 2010, the service providers offering online services while using the FINEID card was around 35,[252] and the number of service providers using the VETUMA gateway to provide electronic services (whether through the FINEID card, TUPAS or another system) was over 60.[253,254] The

242 http://www.hankintailmoitukset.fi/sv/notice/search/?all=1
243 http://ec.europa.eu/idabc/servlets/Doc?id=32305
244 http://www.valtiokonttori.fi/Public/default.aspx?contentid=31569&nodeid=15830
245 http://www.vm.fi/vm/fi/04_julkaisut_ja_asiakirjat/03_muut_asiakirjat/20081103Lausun/name.jsp and http://www.vm.fi/vm/fi/04_julkaisut_ja_asiakirjat/03_muut_asiakirjat/20081103Lausun/02_TTT-kaesikirja-20081029.pdf
246 http://ec.europa.eu/idabc/servlets/Doc?id=32305
247 http://www.epractice.eu/en/news/293726 and http://www.ficora.fi/en/index/viestintavirasto/uutiset/2009/P_32.html
248 http://ec.europa.eu/idabc/servlets/Doc?id=32305
249 http://ec.europa.eu/idabc/servlets/Doc?id=32305
250 http://www.fineid.fi/vrk/bulletin.nsf/HeadlinesFineidEng/B3C0574372BB9B58C22576A-8002B5CC9
251 In 2009, the TUPAS identification system still dominated Finnish eIDM practice. In July 2009, the use of TUPAS tokens as eID had reached 99% for obtaining obtain online government services http://ec.europa.eu/idabc/servlets/Doc?id=32305
252 See www.etu-klubi.fi/ and http://www.etu-klubi.fi/vrk/etuklubi/home.nsf/files/Palveluluettelo%2018/$file/Palveluluettelo%2018.9.2009.pdf
253 http://www.suomi.fi/suomifi/laatuaverkkoon/asiointi_ja_lomakkeet/sahkoinen_asiointi/verkkotunnistaminen_ja_maksaminen/
254 http://www.suomi.fi/suomifi/laatuaverkkoon/asiointi_ja_lomakkeet/sahkoinen_asiointi/verkkotunnistaminen_ja_maksaminen/yleiset_materiaalit/VETUMA-palvelun_tilanne_21_12_2009/VETUMA-palvelun_tilanne_21_12_2009.ppt#539,3,VETUMAa käyttäviä asiakkaita (t=tunnistus, m=maksatus)

adoption of the TUPAS system was estimated at 4.2 out of 5.1 million citizens, and 99% of the VETUMA transactions were supported by the TUPAS system.[255] In 2009, the VETUMA gateway had an average of 40,000 transactions per month.[256]

7.1.5 Conclusions

In the VETUMA case, the most important actors involved were the four founding municipalities: Espoo, Vantaa, Helsinki and Kauniainen. They were the main drivers behind the VETUMA solution in the sense that they formed a strong coalition, convinced the federal government to become involved and gained the commitment of many municipalities in the tender phase. On the federal level, the most important actors were the (temporary) Information Society Programme of the Prime Minister's Office and the valt-IT unit and Treasury Department of the Ministry of Finance. Their role was predominantly to support the nationwide diffusion and the funding of the VETUMA solution.

The most important strategy of the VETUMA coalition was to develop an 'open' eIDM concept, an identification gateway supported by several eIDM systems (such as the banks' TUPAS solution, the FINEID card and mobile phones). The decision to make VETUMA an open concept was primarily driven by the idea that citizen take-up citizens would increase since they could apply multiple identification tools. Statistics show that whereas the take-up of the FINEID card is very low – in December 2009 around 286,000 citizens (of the 5.1 million) had a FINEID card – the actual penetration of the TUPAS system is very high (in 2009 the take-up was estimated 4.2 out of 5.2 million citizens). Approximately 99% of all online authentications to e-Government services are done using TUPAS.[257] In addition, in March 2010 over 60 service providers offered services through the VETUMA gateway, and in 2009 the monthly number of VETUMA transactions was around 40,000. Although the take-up of the VETUMA system by both service providers and citizens seems significant compared to the other cases, its future use is unsure as new legislation may require the application of more secure systems than the widely used TUPAS solution, which could potentially decrease the user base and actual use of VETUMA.

7.2 PARAMETERS AND EVENTS OF THE ADVOCACY COALITION FRAMEWORK

This section explores the influence of the Advocacy Coalition Framework parameters and events. An assessment is made for each parameter and event to discover whether and how the parameter or event affected the joint innovation process.

255 http://ec.europa.eu/idabc/servlets/Doc?id=32305
256 http://www.suomi.fi/suomifi/laatuaverkkoon/asiointi_ja_lomakkeet/sahkoinen_asiointi/verkkotunnistaminen_ja_maksaminen/yleiset_materiaalit/VETUMA-palvelun_tilanne_21_12_2009/VETUMA-palvelun_tilanne_21_12_2009.ppt#542,6,Lajeittain 2009
257 http://ec.europa.eu/idabc/servlets/Doc?id=32305

7.2.1 Attributes of the good

VETUMA is an authentication and payment gateway service, which predominantly relies on the national eID card and the paper PIN-TAN TUPAS token.[258] However, in principle the VETUMA service is open to any identification solution since it is a uniform programming interface for heterogeneous methods.[259] The Finnish authentication concept allows the mapping of PKI-based and non-PKI-based authentication solutions. The FINEID and the TUPAS solutions use the same identification procedure. When using one of the identification tools through the VETUMA service, the VETUMA service sends a query to the Population Information System of the Population Office. Subsequently the user's credentials are verified by the Population Office.

However, the method of obtaining a FINEID or TUPAS identification token differs. Regarding the TUPAS solution, Finnish banks have a statutory obligation to authenticate their customers. At a bank office, the customer's identity is verified while using an official identity document approved by the bank, such as a driving licence, personal identity card, passport or social insurance card with photo. The first TUPAS identifiers must be fetched in person to ensure reliable customer authentication. The TUPAS certification service is accessed through bank-specific TUPAS identifiers created and issued by a bank for their customers. The TUPAS token is a set of papers containing one-time passwords and verification numbers. For example, these can be a combination of a user ID and one-time passwords. Bank identifiers are always personal regardless of whether they are issued for use with private or business/corporate customers.

FINEID cards are issued by the local police, cost €48 and are valid for five years. Applicants have to identify themselves with an ID card, driving licence or passport.[260] The card contains user identity data such as full name, social security number, date and place of birth, gender, nationality and card validity data. The printed data is also stored electronically on the chip. The chip contains two user certificates, allowing the authentication of the citizen and the use of a qualified electronic signature. The authentication and signature PIN codes are individual and vary in length. Both are initially random, and users may change both PIN codes.

The TUPAS bank ID is most popular.[261] From a user point of view, TUPAS authentication and signature present only a few limitations, since the service is accessible even from workstations that are not equipped with a smart-card reader and FINEID middleware. By contrast, the procedures for obtaining the FINEID card are more cumbersome and relatively expensive.

258 http://ec.europa.eu/idabc/servlets/Doc?id=32305
259 http://www.observatory.gr/files/news_events/summit_presentations/Presentation%20Timo%20Karppinen.pdf
260 http://www.fineid.fi/vrk/fineid/home.nsf/pages/0E9115B44F5D5FEAC225708C005014B8
261 http://ec.europa.eu/idabc/servlets/Doc?id=29082

Identification through the VETUMA platform works as follows:[262]

- The user accesses an application which requires identification on a government website.
- The service application on the government website ensures that a certain language is used by the application and creates a request.
- The VETUMA service ensures the validity of the request and opens the VETUMA User Interface into the user's browser.
- The user selects the appropriate method of identification, e.g. FINEID or TUPAS.
- The VETUMA service creates a request for the FINEID or TUPAS service, and the FINEID or TUPAS application performs the identification and creates and sends the response to the VETUMA service.
- The VETUMA service creates an identification response and sends it to the service application of the government website.
- The service application ensures validity of the response.

Several interview reports reveal that the open concept of VETUMA impacted the number of actors involved. One of the involved actors, for instance, stated: 'The VETUMA system is open to any identification tool, for instance the FINEID card or the TUPAS authentication, but also mobile identification solutions. The consequence was that any online identity provider could join up with the VETUMA innovation. OpenID providers are likely to participate in the future as well.'

The interview reports also show that in some cases the implementation procedures for municipalities limited their participation. The VETUMA integration follows a process where the municipality has to sign contracts with different registry owners, such as the Population Office and the banks.[263] After signing the contracts, the municipality has to integrate and test the VETUMA interface implemented in the e-Service environment and has to comply with the service licence requirements, including technical security requirements. Interface integration is done using Fujitsu's Software Development Kit or using the University of Helsinki's open-source software. Several interviews reveal that the reaching of agreements with banks was a particularly difficult process. For example, one of the interviewees stated: 'Every bank had its own agreement, and thus we had to negotiate with all banks separately. We had discussions with all banks. It would have been more efficient if it had been coordinated better.' And another respondent: 'When I entered the project I had to design the rules of the game, because there were no clear rules. [….] One of the problems was the agreements with banks; we needed a framework agreement with each bank so that the municipalities would not have to negotiate with the banks themselves. However, there still is not one agreement for all banks.'

262 http://projectliberty.org/liberty/content/download/3171/21234/file/070423%20-%20Finland%20-%20Nivala%20usecase.pdf

263 http://ec.europa.eu/idabc/servlets/Doc?id=32305

In addition, the majority of respondents agree that the features of the FINEID solution have limited citizen take-up. One of them, for instance, explained: 'There are several reasons why the FINEID card is not very popular in Finland. Today, around 6% of the population has such a card. One of the reasons is that it costs some 50 euros, whereas people can use their online banking systems, which they often already have. TUPAS is de facto authentication. There are far more than four million Fins with a bank authentication. In addition, it is quite a burdensome process to obtain a card. You have to go to the police office, and if you lose your PIN you have to go there again in person. Not to mention that you have to pay around 20 euros for the card reader.'

Several interview reports show that the take-up of the mobile identification solution was also low because of limited usability. One of the involved actors, for instance, stated: 'We made a great effort to launch the mobile application, but the threshold for citizens to obtain it remained too high. For citizens it was a very cumbersome process. First you had to go to the population office to get a certification for mobile identification. Then you had to go to the telecom operator to get the SIM card, which is PKI-based and makes use of the certificate. After that, you had to go to the police office for registration. I still do not understand why people could not register at the population office. Anyway, the process was too burdensome for citizens, and the take-up was low.'

In conclusion, the features of the VETUMA services have impacted the dynamics of the subsystem in the sense that the open architecture of the solution increased the number of electronic identity providers involved in the innovation process. Furthermore, the difficult process of reaching an agreement with the banks in the early stages of the innovation slowed down the implementation. Finally, the characteristics of the FINEID identification solution and the mobile identification yielded a limited take-up of these specific identification systems since citizens find the procedure to (re)obtain the identification tool too burdensome and the price of the FINEID card too high.

7.2.2 Basic distribution of resources

Although specific figures are not publicly available, a report by the National Audit Office[264] revealed that the costs of the VETUMA service in the period from 2004 to 2007 were around 270,000 euros (including costs for the development of some services and implementation). Over the years, the transaction costs (per identification) increased from € 0.045 in 2005, to € 0.095 in 2006, €0.21 in 2007 and €0.56 by the end of 2007. The rise in price by the end of 2007 was due to the termination of the contract with Fujitsu and new pricing by Fujitsu.

264 Valtiontalouden tarkastusviraston toiminnantarkastuskertomukset 161/2008, page 128.

VETUMA customers (public sector organisation using VETUMA in its applications) pay the following costs for the use of the VETUMA service:[265]

- Opening fee of 2,400 euros;
- VETUMA customers are responsible for paying for their own transactions costs.

However, the Finnish Ministry of Finance announced in 2007 that they would pay the opening fee and VETUMA transaction costs until the end of 2007,[266] and in 2008 they stated that they would pay these costs until the end of the year 2008.[267] Interviews reveal that in 2009 the central government also paid these costs.

Regarding the costs of using external services (banks and payment services, mobile operators), the Ministry of Finance published the following rules:

- The VETUMA customer is responsible for all costs;
- The VETUMA customer will also pay for:
  - Development/license fees of VETUMA-enabled service applications;
  - Internal administration costs (for example, maintaining a user register for password authentication).

Most of the initial service providers involved found the funding structure unclear. This lack of clarity affected the dynamics of the subsystem in the sense that there have been several discussions about the funding. However, the majority of respondents did not perceive this to have a significant influence on the innovation process. One of them stated: 'We had many discussions about the funding of the VETUMA service. The central government made several promises, but even in the procurement phase there was no [financial] solution. […] But we knew that one way or the other the funding would be arranged.' Someone else: 'Funding was an issue all the time. Every year we had to wait and see if there would be funding.' And another actor: 'The Information Society Programme invested about half a million. But at the time of the procurement, they [ISP] were still discussing the funding with the Ministry of Finance. They made a deal: ISP would pay the initial costs and the ministry would assume ownership and take care of future funding.'

Several suppliers stated that the financing of the project was not very attractive. One of them, for instance, stated: 'Although we knew that the VETUMA project would not be economically attractive, we decided to bid for it. It was an important project for our authentication business. And thus we made a good price offer. […] Our offer was that we would not get any purchase price for the service we would develop, but that we could sell the training [joining fee] and charge the transaction cost. The problem, however, was that there were not many transactions. […] We organised several road shows to attract organisations to use VETUMA.' And someone of the central government: 'Fujitsu was paying for the system and received a joining fee, a fee for every transaction and for the development of extra

265 http://www.suomi.fi/suomifi/qualitytotheweb/e-Services_and_forms/e-Services/vetuma_service/vetuma_service/VETUMA_service.pdf

266 http://b2cpro.vtt.fi/documents/seminar/b2c-pro-seminaari-mikkola.pdf

267 http://www.suomi.fi/suomifi/qualitytotheweb/e-Services_and_forms/e-Services/vetuma_service/vetuma_service/VETUMA_service.pdf

functions. Fujitsu's best earnings came from the joining fees. Until now [December 2009], around 70 municipalities have joined [which totals 168,000 euros].'

The majority of service providers agree that the temporary financial compensation by the central government was an important incentive for joining up. One of the respondents, for instance, stated: 'We were told that we could join the service and that the state would pay the joining fee and the transaction costs until the end of the year. Therefore we wanted to join up before the end of the year.'

To summarize, the basic distribution of resources affected the dynamics of the subsystem in the sense that there were many discussions between involved parties on the funding of the VETUMA service, but these discussions have not significantly affected the (e.g. direction of) innovation. In addition, it appeared that the temporary compensation of the costs of service providers by the state were an important incentive for service providers to join up.

7.2.3 Fundamental cultural values

Values perceived as important by subsystem actors are best reflected by key policy or visionary documents produced by subsystem actors. However, in Finland there has not been a central document (e.g. a white paper or eIDM vision) outlining the Finnish eIDM vision.[268] Although such generic documents were lacking, interviews reveal that subsystem actors shared several values that affected the innovation process. Firstly, the founding actors found it important to be among the front-running municipalities to apply e-Government strategies. Innovation, the use of new technologies, the creation of an information society – the actors considered all these to be crucial issues. One of the actors, for instance, stated: 'In our municipality we have always tried to be ahead when it comes to e-Government. We were among the first to implement an e-Payment system, we have projects on e-Democracy, e-Inclusion. We find it important to constantly improve our services.' And someone else: 'A few decades ago, we would not have thought that internet use would be so pervasive today. The development of technology provides all kinds of opportunities, and we are trying to reap the benefits. We find it important to keep pace with changes in society.'

Secondly, the majority of respondents stated that the main impetus for developing an eIDM system was to make residents' everyday life easier by enabling citizens to obtain services online. One of the involved parties, for instance, stated: 'The initial

268 Identification systems have been mentioned in the National Knowledge Society Strategy. However, this document was published in 2007, at a time when the VETUMA service was already being implemented and thus did not significantly affect the innovation process. See http://www.epractice.eu/en/document/288224 and http://www.tietoyhteiskuntaohjelma.fi/esittely/en_GB/introduction/_files/11233297000000607/default/tietoyhteiskuntaohjelma_2006_en.pdf. In addition, JUHTA, a division of the Ministry of the Interior, published recommendations for an eIDM system some time before the VETUMA project started, but this document was not perceived as being important by key actors involved in the innovation process. See http://www.jhs-suositukset.fi/web/guest;jsessionid=875F4890622BD0D74BB891A137B32FC0

reason to start the eIDM project was the need for online identification in order to provide citizens with online services. For some services we need to know who is asking for the service, so we have to identify him or her. […] We were – and still are – convinced that obtaining online services saves citizens time. They do not have to travel to the government office and are not restricted by opening hours. This is an important added value since one of today's scarcest commodities is time.' The value of convenience for citizens has also been highlighted in several presentations about the VETUMA service by both cities and central government agencies. In the presentation by the city of Lahti, for instance, the most important aim in implementing the system was to save time and costs for both citizens and government.[269]

In conclusion, the interview reports reveal that one of the crucial factors for launching the project was the fact that the founding municipalities highly valued (technological) innovation. Although not explicitly mentioned in general visions and strategies, these values contributed to the initiation of the project. In addition, interview reports reveal that the value 'convenience for citizens' affected the functional and technical requirements of the solution. The participating parties deliberately decided to develop a gateway that supports several identification systems (e.g. the FINEID card, TUPAS system and mobile eIDM systems), to enhance the usability of the system.

7.2.4 Basic legal structure

The main legal framework for the VETUMA service consists of the following legislation:[270]

- Identity Card Act (829/1999)[271] and the population Information Act (507/1993).[272] These acts give the Population Office the mandate to act as the Finnish government's certification authority.
- The Act on Electronic Signatures (14/2003),[273] the Act on Electronic Services and Communication in the Public Sector (13/2003)[274] and the Act on Electronic Communication within Administration (13/2003). These acts establish the legal guidelines for personal identification and for the production of electronic signatures and services. On 1 September 2009, the Act on Electronic Authentication and Signatures came into force.[275] The objective of the act is to create a set of common rules in order to provide strong electronic identification services and to promote the use of electronic signatures. All service providers offering eIDM services that are branded as 'strong' fall under the supervision and control of these new regulations.[276]

269 http://www.observatory.gr/files/news_events/summit_presentations/Presentation%20Timo%20Karppinen.pdf
270 http://ec.europa.eu/idabc/servlets/Doc?id=32305
271 Henkilökorttilaki 829/1999
272 http://www.finlex.fi/fi/laki/ajantasa/1993/19930507
273 http://www.finlex.fi/en/laki/kaannokset/2003/en20030014.pdf
274 http://www.finlex.fi/pdf/saadkaan/E0030013.PDF
275 http://www.epractice.eu/en/news/293726 and http://www.ficora.fi/en/index/viestintavirasto/uutiset/2009/P_32.html
276 http://ec.europa.eu/idabc/servlets/Doc?id=32305

- The Personal Data File Act (523/1999)[277] and the Act on the Openness of Government Activities (621/1999).[278]
- The Act on Register Administration (166/1996)[279] and its corresponding Decree (248/1996)[280] govern the powers of the Population Office.

Finland has no specific regulations with regard to the process of authentication in general. The e-Signatures law (14/2003) transposes the provisions of the e-Signatures Directive, but does not apply to authentication as such.

Depending on the authentication method (FINEID or TUPAS), e-Government applications use either the FINUID or the SSIN as unique identifier. When using FINEID/FINUID authentication, there are no service provider-related privacy concerns to overcome, thus no special regulations are directly involved.[281] This is not the case when using TUPAS/SSIN authentication, where the handling and storing of the SSIN user by the service provider is regulated by the Personal Data File Act (523/1999). The act does not constitute a compliance framework that service providers contact for certification, but in case of a privacy data breach (disclosure of SSIN user), the service provider can be held responsible for negligence.

The large majority of respondents felt that legislation concerning electronic identification did not have a significant effect on the subsystem or the innovation. However, most of the respondents argued that procurement legislation had an important effect on both the dynamics of the subsystem and the innovation process and outcome. One of them, for instance, stated: ' The basis for electronic identity had already been laid down in 2003 in the Electronic Signatures Act and some other acts. There were not many discussions on these acts. In Finland, for instance, we do not have severe privacy discussions. What has played a role, however, is the Procurement Act. The Procurement Act prohibited the VETUMA consortium from joining the KATSO solution [which was a similar service]. Every municipality that wanted to join had to do this before bidding. This was the reason why the consortium decided to develop their own solution, but now we have ended up with two similar solutions and a critical review by the National Audit Office.' And someone else: 'We discussed the joining up issue with KATSO, but it did not work out because of the procurement law. And we had the same discussions during the VETUMA tendering process, namely that service providers had to be involved in the tendering process. […] These discussions slowed down the process.'

Overall, it appears that it was not the electronic identity or privacy legislation, but the procurement law that affected the dynamics of the subsystem and subsequently the innovation process. The procurement law – and uncertainties resulting from diverse interpretations – prevented municipalities from joining the KATSO project, and the same lack of clarity hampered the VETUMA tendering process.

277 http://www.tietosuoja.fi/uploads/hopxtvf.HTM
278 http://www.om.fi/23963.htm
279 http://www.finlex.fi/fi/laki/ajantasa/1996/19960166
280 Rekisterihallintoasetus (1996/248).
281 http://ec.europa.eu/idabc/servlets/Doc?id=32305

7.2.5 Changes in socio-economic conditions and technology

During the development, implementation and diffusion process of the VETUMA service, one of the most important changes in Finland's socio-economic conditions was the burst of the internet bubble in 2001. In the years 1998, 1999 and 2000, the annual GDP growth was 5.2%, 3.9% and 5.1%, respectively.[282] In 2001, 2002 and 2003, growth dropped to 2.7%, 1.6% and 1.8%. The Finnish economy recovered in the years 2004 to 2007, with respective growths of 2.8%, 4.9% and 4.2%.

Figure 8. Finnish gross domestic product, 1980-2009

A second change was the evolution of technology applied in the identification systems supported by VETUMA. The FINEID card, for instance, requires the use of a card reader and card reader software. Whereas these technologies were relatively immature and had limited availability at the onset of the VETUMA development, today most of these technologies are widely used and mature. In the late 1990s, the costs of card readers were relatively high, they could only be purchased at a very limited number of companies and the software that supported the card readers suffered from teething problems.[283] Today, many companies sell card readers for much lower prices, and their usability has substantially increased.

A third socio-economic change may be the current economic crisis. Although the opinions of economists on the precise impact of the current economic crisis differ substantially, no one would argue that we have not been in a global economic recession since 2008. In Finland, GDP growth in 2008 was 1%, whereas in 2009 it was -6.4% (see figure 8 above).

282 http://www.indexmundi.com/finland/gdp_real_growth_rate.html
283 This was not only the case in Finland, but also in other countries. See, for instance, Srivastava (2005).

The large majority of respondents stated that the burst of the internet bubble at the beginning of the 21st century did not have a significant impact. These statements are endorsed by research carried out by the European Commission, which provided an overview of e-Government budgets in European countries in 2000, 2001 and 2002.[284] The study demonstrates that despite the burst of the internet bubble, the Finnish government's e-Government budgets increased between 2000 and 2002, from 584 million euros in 2000, 641 million in 2001, to 706 million euros in 2002. One of the interviewees explained: 'I do not think that the burst of the internet bubble played any role in the innovation process. There were discussions about the funding of the services but these were more about who is going to pay? And not whether the government is going to pay.'

In addition, most of the respondents agreed that technological changes did not significantly affect the dynamics of the subsystem or the innovation process. One actor, for instance, stated: 'The VETUMA service is open to any electronic identification solution, so any future solutions can be integrated.'

Furthermore, several interviewees expect the current economic crisis to have an impact on e-Government budgets since cutbacks are expected. According to one of the interviewees: 'I do not think it will have an effect in the coming year [2010], but it is sure to have effect in the future since tax income will decrease dramatically. However, for the government, things change with a delay. I think the effects will be apparent in two years.' However, no sound conclusions can be drawn regarding the impact of the current economic crisis on the VETUMA project.

In conclusion, so far there is no sound evidence that the changes in socio-economic conditions and technology affected the dynamics of the subsystem.

7.2.6 Changes in public opinion

Public opinion on the VETUMA solution is most clearly voiced in the media, such as national newspapers. Over time, several newspapers have published articles on the VETUMA project. In 2005, most articles were related to electronic identification and e-Government in general. In particular, DigiToday,[285] a Finnish newspaper specialised in ICT developments, reported on several e-Government issues. In December 2005, for example, it published an article on the launch of the e-Card in Austria.[286] In 2006, several other newspapers published articles related to electronic identification or e-Government in general. It-viikko, for instance, reported in February 2006 that a Finnish member of the European Parliament found that

284 European Commission, (2006), 'e-Government Economics Project (eGEP)', Expenditure Study Final Version, Brussels. The only data available to the public on public administration ICT and e-Government expenditure in Europe are those presented in the EITO (European Information Technology Observatory) 2002 edition, which contained a monographic section on e-Government.

285 http://www.digitoday.fi/page.php?page_id=63

286 http://m.digitoday.fi/?page=showSingleNews&newsID=200517968

government organisations in Finland had poor cooperation in the area of ICT.[287] In December 2006, the newspaper reported that the VETUMA service had won an award for being one of the best examples of how various government actors jointly work together on an ICT project.[288] DigiToday published several articles in 2006 on the positive results of the Information Society Programme[289] and concerns of the Green League on the security of electronic voting.[290]

In 2007, several newspapers wrote about the termination of the Information Society Programme. It-viikko, for instance, published an overview of the results achieved by the programme.[291] In the same year, more critical articles on VETUMA or related projects appeared in several newspapers. For example, DigiToday published an article on the limited diffusion of the FINEID card.[292] However, the article also mentioned some advantages of the VETUMA service, such as the possibility to electronically sign documents. In addition, in 2007 several articles appeared on tangible electronic services available through the VETUMA service. It-viikko reported on an experiment with patient data access by means of an electronic form and the VETUMA authentication solution.[293] DigiToday published an article on the use of VETUMA by the Board of Education so people could sign up for secondary-school teacher training online.[294]

In 2008, several newspapers reported on the critical report by the National Audit Office concerning the development of electronic identification solutions by the government. The Helsingin Sanomat,[295] for instance, gave a summary of the report's main conclusions: the limited use of the FINEID card and the lack of a central coordination of electronic identification projects. In the same year, several articles appeared on new services launched by governments that make use of the VETUMA service. The newspaper Iltalehti,[296] for instance, reported on the use of the VETUMA solution by the Hailuoto ferry (largest island of the northern part of the Gulf of Bothnia and a municipality of the county Oulu).[297] In addition, most articles in 2009 related to the VETUMA services were on new services that use the solution. Helsingin Sanomat reported on new services in Helsinki,[298] and Iltalehti

287 http://m.itviikko.fi/?page=showSingleNews&newsID=2006763
288 http://www.itviikko.fi/ratkaisut/2006/12/20/fujitsun-vetuma-vei-voiton/200624006/7
289 http://www.digitoday.fi/data/2006/01/05/saavutukset-myonteisia-tietoyhteiskunnassa/20063291/66
290 http://m.digitoday.fi/?page=showSingleNews&newsID=20064974
291 http://m.itviikko.fi/?page=showSingleNews&newsID=20073136
292 http://www.digitoday.fi/tietoturva/2007/01/11/mobiilitunnistus-tulee/2007799/66
293 http://www.itviikko.fi/ratkaisut/2007/10/02/vtt-vauhditti-tiedonsiirtoa-potilaan-ja-laakarin-valilla/200724319/7
294 http://m.digitoday.fi/?page=showSingleNews&newsID=200712979
295 http://www.hs.fi/
296 http://www.iltalehti.fi/etusivu/
297 http://www.iltalehti.fi/oulu/200805237696949_ou.shtml
298 http://www.hs.fi/paakirjoitus/artikkeli/Talousongelmat+Ven%C3%A4j%C3%A4n+riesana/HS20090204SI1MA010sx

on the intentions of the Finnish government to use the service for vehicle registration.[299] Iltalehti published some critical articles on electronic voting in 2008.[300]

The majority of respondents agree that the most critical articles on the conclusions of the National Audit Office were those that dealt with the government's various electronic identification projects. However, many also stated that the criticism in the newspapers did not produce any significant effects either. One of the actors, for instance, explained: 'To me it seems as if the audit is a kind of media happening. For newspapers this is news. But in my opinion, it did not have any effect. You just have been a bad boy.' And someone else remarked: 'No, it did not affect the innovation. VETUMA is still a good service. And at the time, it was already put in place and used by service providers. And they are still using it.' But some expect the report to have an effect on the future direction of electronic identity policy. For example, one of the respondents stated: 'It was an issue in our department because the secretary general had someone to answer to. But it wasn't the minister. I think that in the long run it may have an effect. It may contribute to the integration of several separate electronic identification tools into one.' However, as yet there is no sound evidence that the National Audit Report had an effect on the integration of several solutions.

To summarize, until now there has been no evidence to confirm that newspaper articles on the VETUMA service have significantly affected the dynamics of the subsystem.

7.2.7 Systemic governing coalitions

During the VETUMA innovation process, there were several changes in systemic governing coalitions. Firstly, the Finnish Information Society Programme, which ended in 2007, was initiated in September 2004 to promote information society in Finland.[301] The project leader of the Information Society Programme was actively involved in the VETUMA innovation. She was in the management group of the innovation and played a key role in the funding of the solution. The Information Society Programme was temporary, and therefore in 2006 the question was raised which central government body would assume ownership of the VETUMA project. Eventually it was decided that the valt-IT unit of the Ministry of Finance would take over the project. Secondly, in 2009 the ownership of the VETUMA project was transferred from the valt-IT unit of the Ministry of Finance to the State IT Service Centre of the State Treasury.[302] The State IT Centre manages government-wide electronic services for municipalities, including the online identification platform VETUMA.

299 http://www.iltalehti.fi/autot/2009110510549956_au.shtml
300 http://www.iltalehti.fi/paakirjoitus/200904109397625_pk.shtml
301 http://www.tietoyhteiskuntaohjelma.fi/en_GB/index.html
302 http://www.statskontoret.fi/public/Default.aspx?culture=sv-FI&contentlan=3&nodeid=15808, see http://www.ica-it.org/conf43/docs/Conf43_The_Status_of_ICT_in_Governments_2009.pdf, page 4

According to a vast majority of respondents, when the VETUMA project underwent a change of ownership, it did not substantially affect the dynamics of the subsystem or the innovation process. One actor, for instance, contended: 'The discussion was about who would fund and have ownership, and not whether the government was going to fund and have ownership. […] The discussions were about financial preconditions, but it did not affect the cooperation or the innovation process.' Regarding the shift of ownership to the State Treasury, the majority of respondents also agree that it did not significantly affect the dynamics of the subsystem or the innovation process. An involved actor explained: 'It did not have any effect; it was just an administrative change. The direction of the innovation did not change, neither did the funding principles. Moreover, some of the government practitioners involved also moved from valt-IT to the State Treasury.'

Overall, the changes in governing coalitions did not appear to substantially impact the direction or outcome of the innovation.

7.2.8 Policy decisions and impacts from other subsystems

Over time, there were three subsystems, the decisions, policies or strategies of which were related to VETUMA project, namely: the competing KATSO coalition, the (national) political subsystem and the European subsystem.

Firstly, the local authorities were not – as in other case studies – 'another' subsystem, since they were the initiators and therefore made part of the VETUMA subsystem. The competing KATSO coalition, however, was an important other subsystem. The KATSO coalition was a consortium of national actors who jointly developed a similar solution by the same name.[303] The key government actors involved in KATSO were the Finnish Tax Administration, the Ministry of Labour and the Social Insurance Institution of Finland.[304] KATSO's project goal was largely similar to the goal of the VETUMA project, namely to develop an eIDM platform that makes use of several electronic identification solutions (such as national smart cards and net bank identification) in order to provide citizens with online services.[305]

Another subsystem that raised issues related to the VETUMA system was the national political system. During the early days, when the municipalities of Vantaa and Espoo were exploring ideas about the development of an electronic identification system in 2003, Matti Vanhanen was elected Prime Minister (June 2003), continuing the coalition government between the Centre Party (KESK), the Social Democrats (SDP) and the Swedish People's Party, which was established by his predecessor. In 2007 – the phase during which the VETUMA service was developed and implemented – the Centre Party formed a coalition government with the Na-

303 https://www.tunnistus.fi/, Katso is an identification service for web services of member organisations.

304 http://ec.europa.eu/information_society/activities/ict_psp/documents/eid_good_practices_modinis_study.pdf

305 http://cis.ier.hit-u.ac.jp/Japanese/society/conference1001/kiiski-paper.pdf

tional Coalition, Swedish People's Party and the Green League. Matti Vanhanen continued as prime minister. Over time, several parliamentarians posed questions about the VETUMA innovation. In 2000, the Left Alliance party (VAS) criticised the FINEID card.[306] The main criticism of the party was the limited take-up by citizens and the card's five-year period of validity.[307] In 2002, the Left Alliance party again posed questions on the limited use of the FINEID card.[308] In 2002, the Centre Party stressed the importance of the development of a knowledge society and – as an inherent element of this – electronic government services to citizens.[309] In 2005, the Left Alliance again raised questions about the FINEID card, its validity and limited take-up. The party also criticised the costs of the FINEID card for citizens. In 2006, the Green League wondered whether tangible results had been achieved by the Information Society Programme and addressed the need for more national coordination of e-Government projects and cooperation between government bodies.[310] In October 2008, there was a large debate about the Finnish Information Society and the conclusions of the National Audit Office on the government's electronic identification projects.[311] Several parties criticised the lack of a central coordination in these projects.

A third subsystem relevant for the VETUMA innovation was the European Commission. The European Commission has been engaged in eIDM issues since the late 1990s. The Information Society and Media department had an e-Government unit, whose name changed to 'ICT for Government and Public Services' in 2007. The unit organised and still regularly organises meetings with the e-Government subgroup, which represents all member states. In addition, the unit established expert groups, one of which is on eIDM. At the European level, there were several EU projects and directives on eIDM systems. In 1999, the European directive on electronic signatures went into force.[312] The eID directive laid down the criteria that form the basis for legal recognition of electronic signatures. In 2004 and 2005, the European MODINIS Project turned it focus, among other things, onto assessing the status quo of eID systems in European member states and the exploration of possible European eID systems.[313] In 2005, the IDABC's eID Interoperability for PEGS programme was launched, the objective of which aims to analyse the eID

306 Finland was the first country in Europe to issue an electronic identity card, the FINEID card. The project started early in 1998, and the first card was presented to the Finnish Prime minister on 7 December 1999, as a way of starting the application phase. See http://www.fidis.net/resources/deliverables/hightechid/int-d36000/doc/30/

307 http://www.eduskunta.fi/triphome/bin/thw/trip?${APPL}=utpptk&${BASE}=faktautpPTK&${THWIDS}=0.33/1263469833_279065&${TRIPPIFE}=PDF.pdf

308 http://www.eduskunta.fi/triphome/bin/thw/trip?${APPL}=utpptk&${BASE}=faktautpPTK&${THWIDS}=0.9/1263469569_209911&${TRIPPIFE}=PDF.pdf

309 http://www.eduskunta.fi/triphome/bin/thw/trip?${APPL}=utpptk&${BASE}=faktautpPTK&${THWIDS}=0.41/1263469421_196644&${TRIPPIFE}=PDF

310 http://www.eduskunta.fi/triphome/bin/thw/trip?${APPL}=utpptk&${BASE}=faktautpPTK&${THWIDS}=0.38/1263467498_334509&${TRIPPIFE}=PDF

311 http://www.eduskunta.fi/triphome/bin/thw/trip?${APPL}=utpptk&${BASE}=faktautpPTK&${THWIDS}=0.2/1263468182_461637&${TRIPPIFE}=PDF.pdf

312 http://europa.eu/legislation_summaries/information_society/l24118_en.htm

313 http://ec.europa.eu/information_society/eeurope/2005/all_about/modinis/index_en.htm

and authentication interoperability requirements.[314] In 2008, the STORK project was launched, which aims to establish a European eID Interoperability Platform allowing citizens to establish new e-relations across borders upon presentation of their national eID.[315] In addition, Capgemini publishes an annual benchmark on e-Government progress in the European Union member states.

As stated in previous sections, the KATSO consortium and solution did not affect the VETUMA consortium or innovation. The two electronic identity tools were developed totally separately from each other. This conclusion, among others, was made in the National Audit Office's report on electronic identification solutions developed by the Finnish government.[316] An involved actor explained: 'Before VETUMA there was the KATVE consortium, which built the KATSO solution for the government. It was not possible for the municipalities to join up since only the organisations mentioned in the tender could use the solution. […] Consequently, the two solutions [VETUMA and KATSO] were developed separately from each other.'

Most of the respondents stated that politics (e.g. chamber questions) did not significantly affect the dynamics of the subsystem. However, some respondents argued that because certain subjects (such as the Information Society, the improved cooperation among municipalities and increased central coordination of ICT projects) were high on Vanhanen's political agenda, this stimulated the central government's funding of the VETUMA solution. One of the actors, for instance, stated: 'Although the central administration did not have a strong e-Government policy, the fact that cabinet members gave ICT great attention provided a basis of willingness on the part of government practitioners to be involved and try to fund it. […] However, there was not a single, specific minister who pushed the VETUMA innovation. Vanhanen, for example, considered VETUMA just one of many ICT projects.'

The large majority stated that the European subsystem predominantly had a general effect on Finnish e-Government, and in some instances specifically on the VETUMA innovation. According to several respondents, politicians and therefore practitioners of central government are interested in Finland's e-Government performances in comparison with other European countries. In addition, Finnish law is affected by European law. One of the involved government practitioners, for instance, stated: 'Of course we have to comply with European directives. Some of these directives concern subjects related to e-Government – such as the e-Signature directive – and thus affect Finnish e-Government laws and policies.'

In conclusion, it appears that the national KATSO coalition did not affect the dynamics of the subsystem and the outcome of the innovation. In addition, the attention cabinet members devoted to ICT subjects, cooperation between munici-

314 http://ec.europa.eu/idabc/en/document/6484
315 https://www.eid-stork.eu/index.php?option=com_frontpage&Itemid=1
316 http://www.vtv.fi/files/145/161_2008_Tunnistuspalvelut_NETTI.pdf

palities and national coordination of ICT projects resulted in a basic willingness to invest in the VETUMA project. The Europe subsystem influenced e-Government legislation and policy in a more general way.

7.2.9 Conclusions

Regarding the Advocacy Coalition Framework, the following parameters and events affected the innovation process:

- The *features of the VETUMA services* impacted the dynamics of the subsystem in the sense that the open architecture of the solution increased the number of electronic identity providers involved in the innovation process. Furthermore, in the early stages of the innovation the difficult process of reaching an agreement with the banks slowed down the innovation process. Finally, the characteristics of the FINEID identification solution and the mobile identification resulted in a limited take-up of these specific identification systems since citizens find the procedure to (re)obtain the identification tool too burdensome and the price of the FINEID card too high.
- The uncertainty regarding the *basic distribution of resources* affected the dynamics of the subsystem in the sense that there were many discussions between involved parties on the funding of the VETUMA service, but these discussions did not significantly affect the (e.g. direction of) the innovation. In addition, it appeared that the temporary compensation of service-provider costs by the state were an important incentive for service providers to join up.
- Some of the *shared values of the subsystem* affected the innovation process in the sense that they were (amongst others) an impetus to launch the project, and some values shaped the features of the innovation.
- In particular, the *procurement law* affected the dynamics of the subsystem and subsequently the innovation process. The procurement law – and the uncertainties resulting from diverse interpretations – prevented municipalities from joining the KATSO project, and the same lack of clarity hampered the VETUMA tendering process.
- So far, there is no sound evidence that the *changes in socio-economic conditions and technology* affected the dynamics of the subsystem.
- Until now, no evidence has been found to suggest that *public opinion* on the VETUMA service significantly affected the dynamics of the subsystem.
- The changes in *governing coalitions* did not appear to substantially impact the direction or outcome of the innovation.
- The *national KATSO coalition* did not affect the dynamics of the subsystem and the outcome of the innovation. In addition, the attention *cabinet members* devoted to ICT subjects, cooperation between municipalities and national coordination of ICT projects resulted in a basic willingness to invest in the VETUMA project. The *European subsystem* influenced e-Government legislation and policy in a more general way.

7.3 SOCIAL CAPITAL VARIABLES

This section draws conclusions for each of the social capital variables regarding the influence social capital characteristics have on the dynamics of the subsystem and subsequently on the joint, technological innovation process. Each subsection concludes with an assessment of the influence of the specific variable on the innovation process, outcome and/or impact.

7.3.1 Openness versus group closure

Although the founding municipalities were open to any government organisation joining up – in fact, they deliberately involved other municipalities and the central government – they were relatively closed to other electronic identity initiatives. From the onset of the project, the intention of the informal project group was to make their solution a national solution. They were, of course, aware that other government organisations also needed an electronic identification tool to provide citizens and businesses with services, and they did not want to invest in something that would be overhauled later on by central government policy. Several respondents stated that their decision to involve Helsinki was strategic in the sense that the adoption of the VETUMA innovation by Helsinki would be an important reason to make VETUMA the national solution, since Helsinki had the largest population of all Finnish cities. One of the respondents, for instance, stated: 'It was very important that Helsinki had climbed on board [of the VETUMA innovation]. Thanks to their involvement, we had a coalition representing one fifth of the Finnish population. Central government cannot say no to that. The central government did not have any choice – they had to come along.'

Some government actors who were initially outside the VETUMA coalition felt that they were forced to join up with the VETUMA and that they were poorly represented in the project. Various respondents stated that some municipalities felt as if they did not have a choice but to join it. One of the interviewees, for instance, stated: 'Another group of larger cities, such as Tampere, Oulu, also collaborated on e-Government subjects. They saw the VETUMA innovation as just another e-Government innovation initiated by the cities of the capital region [municipalities which initiated VETUMA]. They felt that the cities in the capital region – again – got all the funding from the central government for their e-Government projects.' In addition, the VETUMA coalition had involved the Ministry of the Interior and the Prime Minister's Office, but not Kuntaliitto,[317] a Finnish association of local and regional authorities. Since the smaller municipalities in particular considered themselves well represented by Kuntaliitto, some of the smaller municipalities felt that their demand was not being heard by the VETUMA coalition. One of the respondents explained: 'In general, the interests of smaller municipalities are better promoted by Kuntaliitto than by the bigger cities. But Kuntaliitto was not part of the VETUMA group, and so some smaller municipalities felt that their interests were not being served.' Someone else stated: 'The involvement of Kuntaliitto

317 http://www.kunnat.net/k_Kuntaliitto_peruslistasivu.asp?path=1;184;276;830

would have slowed down the innovation process, and therefore for some of the founding municipalities it was not very attractive to involve them.'

Furthermore, there was a competing coalition consisting of the Finnish Tax Administration, the Ministry of Labour and the Social Insurance Institution of Finland,[318] which developed a similar system called KATSO.[319] The KATSO project had started in 2004, and in 2005 there was a meeting between the VETUMA and the KATSO subsystem to explore possible cooperation. Although the large majority of interviewees stated that the procurement law prevented both subsystems from cooperation, there were some respondents who stated that not only procurement law but also group closure mechanisms hampered cooperation between the subsystems. One of these respondents, for instance, stated: 'Of course the procurement law was a problem. But I had the impression that the law was also used as an excuse not to cooperate. Cooperation would have implied mutual adaptation. […] The law could have been interpreted in several ways and it was explained very restrictively; another interpretation would have supported cooperation.' Another respondent: 'Kuntaliitto wanted to adopt the KATSO solution. But they [some of the founding members] did not want to join. They said: "Interesting, but not for us." […] I posed the question several times [whether the VETUMA parties could not or did not want to cooperate with the KATSO parties]. It was said that it was not possible, because of legislation. But – in my opinion – another reason was that Kuntaliitto and the big cities did not get along very well. And there were questions like "who would own the system"'.

Finally, group closure mechanisms can also be found in the sense that the initiating parties were relatively closed to new ideas or directions of the innovation process. The majority of the respondents involved stated that after having defined the specifications of the system, the direction of the innovation was clear to all and largely unchangeable. One of the respondents said about the participation of new municipalities: 'No, we were not afraid that municipalities that would join up would change the direction of the innovation. It simply worked like this: if you join such a group, you have to accept the purpose and decisions made by the group.'

Concluding, group closure affected the joint innovation process in the sense that not all interests of service providers that eventually became involved in the innovation were promoted in the early phases of the innovation. On the other hand, group closure mechanisms in the initiation phase of the innovation appeared to speed up the innovation process as it was easier to reach consensus.

7.3.2 Strength of the ties

The large majority of interviewees stated that the presence of existing ties played an important role in the innovation process.

318 http://ec.europa.eu/information_society/activities/ict_psp/documents/eid_good_practices_modinis_study.pdf

319 https://www.tunnistus.fi/. KATSO is an identification service for web services of member organisations.

Particularly in the initiation and development process, powerful ties strongly influenced the involvement of parties and coalition building. In the initiation phase, several strong ties between government practitioners from municipalities – but also between government practitioners from municipalities and central government – played an important role in the formation of the VETUMA coalition. The involved persons from Espoo, Vantaa, Helsinki and Kauniainen had known each other for a long time and had cooperated in several projects. In addition, the government practitioners from Vantaa and Espoo had strong relationships with some government practitioners from the central government. The vast majority stated that the strong ties between the persons involved had an important impact on the formation of the coalition. One of them, for instance, stated: 'Yes, of course these personal strong ties helped to build the coalition. It was quite easy to get all the parties together. Moreover, we had already cooperated in several projects, so it was just a matter of discussing it and start it.' In addition, several respondents stated that strong and medium ties were used to gain more general support for the innovation. One of these respondents, for instance, explained: 'Strong, but also medium, ties have been important for creating a general basis of support for the VETUMA service. […] We have used many ties, at the operational but also at a higher level. Even at a major level. The ties used depended on the kind of support we needed. It works very informally. I could, for instance, ask someone: "please go talk to him or her for backing."'

In the diffusion phase, however, the presence of (strong, medium or weak) ties appeared to be less relevant. The majority of respondents agreed that ties predominantly played a role in the early phases, whereas in the dissemination phase it became more important to make the innovation attractive for service providers to join up. One of the interviewees, for instance, explained: 'Whereas in the initiation phase we needed strong ties to create consensus about the characteristics of the innovation and to form a coalition, in the diffusion phase it was just a matter of providing municipalities with information. Existing contacts were not very important. We built a website with all the information, organised road shows and seminars. The most important thing in this [the diffusion] phase was to convince municipalities of the innovation's potential. And of course the temporary [financial] compensation by the central government was an important reason for municipalities to join up.' And another respondent: 'We joined up because it seemed like a good application to us. We gathered information through the website. We also contacted the person who was mentioned on the website to acquire some more information. Then we made the decision to join up, based on an assessment of the pros and cons.'

Several examples show that existing medium and strong ties were specifically used for the promotion of interests. One example is the mobile telecom industry's lobby to change the procedures for citizens to obtain an identification application on their mobile phone. One of the actors involved in this lobbying process stated: 'Back then (2006), I contacted several top officials at ministries. I used the contacts I had in these organisations. Most of them I knew quite well. I also called the director of the Information Society Programme. I knew her as I was a member of

the programme. We even arranged a meeting with the Minister of Transport and Communications. We told them that the process [to obtain an electronic ID] was too bureaucratic and that the law had to be changed. It took some hard lobbying. Especially the Ministry of the Interior and the police were difficult to convince. All in all, I guess the lobbying worked since a new signature law was enacted in September of this year (2009), which enables private companies to issue IDs.'

Several of the respondents stated that having medium and strong ties with other actors stimulated efficient cooperation in the development phase. One of these respondents, for instance, explained: 'Yes it really helped that we knew each other well. We knew who had which expertise, who had which contacts and who had which skills. If there was a problem, I could easily assemble a group of people who could solve the problem. It made our team work very efficiently.' In addition, several interviewees referred to ties that were used to gain access to strategic information. One of them, for instance, stated: 'We did not know the exact interests and opinions of them [KATSO coalition], but he [government practitioner of the Ministry of Finance] knew some of them and contacted them to acquire some more information about their intentions.' And someone else stated: 'The fact that I have such a large network within governments helps me to understand why parties do what they do. I know their motives, plans and strategies. It also helps me to choose my own strategy.'

There was one example in which ties were used to influence public opinion on e-Government projects. An involved respondent stated: 'She [CEO of the Information Society Programme] has worked for Talentum, a media company that publishes several journals and literature. She has contacts with newspapers and writes in a magazine about ICT and society. […] There were several occasions when she used her contacts to get public attention for a certain event or issue; for instance for the results of the Information Society Programme and the e-Government projects belonging to this programme.'

To summarize, both weak and strong interpersonal ties affected the joint innovation process in the sense that these ties were used to form coalitions, to influence opinions, to gain access to strategic information, to involve parties and/or to reach consensus. However, existing ties were most relevant in the early innovation stages.

7.3.3 Heterogeneity of the network

The heterogeneity of the actors involved was relatively high in the VETUMA innovation process. Different kinds of service providers were involved, such as municipalities, a hospital, the National Board for Education and the National Gallery. In addition, several central government bodies participated, such as the Ministry of the Interior, the Prime Minister's Office and the Ministry of Finance. Furthermore, diverse electronic identity providers joined up, such as the Population Register, banks and the mobile telecom industry. The early involvement of these actors resulted in a broad adoption basis among Finnish government organisations. A re-

spondent stated about the involvement of various parties: 'As I said, the coalition group was rather determined about the technical requirements of the innovation and did not change their direction. On the other hand, the coalition was open to every party that supported the VETUMA idea. Moreover, in the beginning they created a sound basis with all kinds of parties, such as service providers, policy makers, suppliers of electronic identity solutions, which enabled them to achieve a nationwide roll-out of the innovation. Of course, there is still the other KATSO system, but VETUMA might win the race as they have a very solid and broad basis of government and private industry adopters.'

In conclusion, the heterogeneity of the group involved in the idea and development phase of the innovation process increased the adoption basis of the innovation.

7.3.4 Broker's position

In several instances, actors had a broker's role in the VETUMA innovation process. In the initiation phase, the government practitioner of Vantaa played a central role as she had the strongest ties with the other people in the coalition and used these ties to form the coalition. Several respondents stated that they were approached by the government practitioner of Vantaa to join up. In the procurement phase, the city of Helsinki had a formal broker's role. According to Finnish procurement law, all actors who want to make use of the services developed by the winning supplier have to be involved in the tendering process. For procurement projects of the central government, the Hansel office arranged the joint tendering process. In the VETUMA case, Helsinki city was the intermediary party that arranged for the participation of all other municipalities. Also in the process of assigning the ownership of the VETUMA service one of the actors functioned as a broker. The programme director of the Information Society Programme was in the management group of the VETUMA project and at the same time negotiated with contacts she had in diverse ministries about the ownership.

The degree of influence of less connected actors within the subsystem was also interesting. At the onset of the innovation, the programme director of the Information Society Programme, for instance, was relatively new in the network of municipalities. She got involved thanks to a government practitioner of the Ministry of the Interior who was on the board of the Information Society Programme. She stated about her position: 'I did not know the people from the municipalities, but it helped that I had worked for a municipality; I understood their language, problems and interests. In addition, I already had a strong network at the central level since I was the director of the Information Society Programme. In fact, my limited ties with the founding municipalities did not affect my position. I quickly got to know them, and cooperation went well.' In the diffusion phase, several actors became involved who were not very well connected in the existing subsystem. Someone of the National Board of Education stated: 'I did not know these persons before the National Board of Education decided to adopt the innovation. I have met several persons – Anne, for instance, since joining up. The fact that I did not

know anyone did not affect the position of the National Board of Education. We just kind of purchased the VETUMA service.'

It is worth noting that Kuntaliitto was established to develop joint services of local authorities, and thus it formally has a broker's position.[320] However, it was not able to use this position as it were not perceived by subsystem actors to be the right organisation to develop a national eIDM system.

In conclusion, particularly in the initiation phase, actors with a strategic position within the network were able to influence the direction of the innovation.

7.3.5 Interpersonal trust

According to the majority of respondents the existence of trust between actors predominantly played a role in the initiation phase of the VETUMA innovation. All actors involved in the early stages of the innovation stated that the level of trust between them was high. One of them, for instance, reported: 'It was not just that we were geographically close, we also had a very high level of interpersonal trust. I was very sure that they would not play a trick on me. Of course, we had different interests and conflicting opinions, but we just discussed them. We did not have hidden agendas. The level of trust between us and the KATSO parties was lower, but still there was no distrust. We were a bit more careful about what information to provide. But in the core group we were very open towards each other.' Various actors involved explained that in later phases the level of trust was lower, but that there was still a solid basis of interpersonal trust. One of them, for instance, said: 'At a certain point in time there was a conflict of interest and different opinions on the direction of the innovation. There was some friction and discussion, but we solved these problems.'

Some of the respondents related the level of trust to an efficient cooperation between parties. One of the respondents, for instance, stated: 'Because we had trust, we did not need to put everything on paper. Everybody knew that I worked in an informal way, not on paper. Some institutes expect you to have all agreements down on paper, but we did not. For instance, the State Audit Office wanted everything on paper. It is their role to watch government organisations and thus have a certain degree of distrust.' Several interviewees pointed to the fact that the high level of trust in the initiation phase counterbalanced some uncertainties and risks. One of them explained: 'As I mentioned before, for us it was not clear, even not in the procurement phase, how the project would be funded. We had many discussions about it, but we were very sure that Katrina would find a solution. We knew that she would arrange it, we trusted her. Without trust we would not have been able to rely on her promises.'

There were also some examples of people trusting each other in the sense that they were convinced that the other would act in an honest way, even though

320 http://www.kunnat.net/k_Kuntaliitto_peruslistasivu.asp?path=1;184;276;830

they did not trust the other person's capabilities. One respondent explained it as follows: 'I was not convinced that the Ministry of Finance would be able to adequately continue the VETUMA innovation. I thought that it could be the end of the innovation because they did not have the expertise to advance it.' Or, by contrast, that their trust was predominantly based on the expertise of the other and not so much on the feeling that the other would be act in an honest way. One of the respondents stated: 'The most important thing in our relationship with Fujitsu was our trust in their expertise. We knew that they had done the job before and that they were able to deliver a good product. This was also one of the reasons to award Fujitsu the tender. […] Trust in the employees of Fujitsu was less relevant since we had a clear contract with Fujitsu with very detailed specifications.'

It also appeared that the level of trust was less relevant in later stages of the innovation. The majority of respondents involved in the diffusion stage said that the level of trust was not that relevant. One of them explained: 'At the onset of the innovation, the level of trust was important as there were more risks. The innovation could fail; the procurement phase was also quite risky because the complex regulations meant that we did not know if we were doing it by the book. There were several uncertainties. Whereas in the diffusion phase there was a clear-cut solution, and for the participating parties it was just a question of whether it was interesting to join or not. Trusting people was less important than trusting the solution.' It thus seems that in the early stages of the innovation, there were more risks and uncertainties, which made trust more relevant. Someone else stated: 'Interpersonal trust did not play a role in our decision to adopt VETUMA. What was important for our decisions though is that we trusted the quality of the solution; that we thought it to be the best solution to provide online services to our clients. As the description of the functionalities of the system was very clear and also the service delivered by Fujitsu [e.g. training and toolkit] there were not many uncertainties or risks for us.'

Several respondents revealed that opportunistic behaviour can result in someone's exclusion from the network. One of these respondents explained: 'I could not mention someone I totally distrust. One knows that some people have their own interests, but this is not the same as distrust. I know that within my network people who do not keep their promises or cheat will be excluded from the network. It is a very small, dense network, and people do not accept distrustful people.' Someone else: 'In the 30 years that I have worked for government, I have barely seen games and tricks. This is not the Finnish way to do business. Of course, often you do not agree with someone or there are conflicting interests, but then you talk about it or ignore it and move on. Of course dishonest and opportunistic people exist in Finland, but in many networks they will not be accepted.'

To summarize, the presence of interpersonal trust affected the joint innovation process in the sense that actors were willing to take risks and experiment in a high-trust environment. The presence of trust appeared to be more relevant in the early innovation stages than in the later innovation stages.

7.3.6 Conclusions

It seems that the characteristics and dynamics of the subsystem significantly influenced the joint technological innovation.

- *Group closure* affected the joint innovation process in the sense that not all the interests of service providers were promoted in the early phases of the innovation. On the other hand, group closure mechanisms in the initiation phase appeared to speed up the innovation process since it was easier to reach consensus.
- Both *weak and strong interpersonal ties* affected the joint innovation process in the sense that these ties were used to form coalitions, influence opinions, access strategic information, involve parties and/or reach consensus. However, existing ties were most relevant in the early innovation stages.
- The *heterogeneity* of the group involved in the idea and development phase of the innovation process increased the adoption basis of the innovation.
- Particularly in the initiation phase, actors with a *strategic position* in the network were in a better position to influence the direction of the innovation.
- The *presence of interpersonal trust* affected the joint innovation process in the sense that actors were more willing to take risks. In addition, the presence of trust appeared to be more relevant in the early than in the later innovation stages. Furthermore, a high level of trust resulted in efficient cooperation between parties. Lastly, in some cases trust was predominantly based on the expertise of the other and not so much on the feeling that the other would act in an honest way.

7.4 OVERALL CONCLUSIONS

Regarding the parameters of the framework used for this research, the following aspects appear to have influenced the dynamics of the subsystem, the innovation outcome and/or impact:

- The *features of the VETUMA services* impacted the dynamics of the subsystem in the sense that the open architecture of the solution increased the number of electronic identity providers involved in the innovation process. Furthermore, in the early stages of the innovation, the difficult process of reaching an agreement with banks slowed down the innovation process. Finally, the characteristics of the FINEID identification solution and mobile identification have resulted in a limited take-up of these specific identification systems since citizens find the procedure to (re)obtain the identification tool too burdensome and the price of the FINEID card too high.
- The uncertainty regarding the basic *distribution of resources* affected the dynamics of the subsystem in the sense that there were many discussions between involved parties on the funding of the VETUMA service, but these discussions have not significantly affected the (e.g. direction of) the innovation. In addition, it appeared that the state's temporary compensation of the costs made by service providers was an important incentive for service providers to join up.

- Some of the *shared values of the subsystem* affected the innovation process in the sense that they were (amongst others) an impetus for launching the project, and some values shaped the features of the innovation.
- The *procurement law* in particular affected the dynamics of the subsystem and subsequently the innovation process. The procurement law – and uncertainties resulting from diverse interpretations – prevented municipalities from joining the KATSO project, and the same lack of clarity hampered the VETUMA tendering process.
- So far, there is no sound evidence suggesting that *changes in socio-economic conditions and technology* affected the dynamics of the subsystem.
- Until now, no evidence has been found suggesting that *public opinion* on the VETUMA service significantly affected the dynamics of the subsystem.
- It appears that changes in *governing coalitions* did not substantially impact the direction or outcome of the innovation.
- The *national KATSO coalition* did not affect the dynamics of the subsystem and the outcome of the innovation. In addition, the attention *cabinet members* devoted to ICT subjects, cooperation between municipalities and national coordination of ICT projects resulted in a basic willingness to invest in the VETUMA project. The *European subsystem* influenced e-Government legislation and policy in a more general way.
- *Group closure* affected the joint innovation process in the sense that not all the interests of service providers were promoted in the early phases of the innovation. On the other hand, group closure mechanisms in the initiation phase appeared to speed up the innovation process since it was easier to reach consensus.
- Both *weak and strong interpersonal ties* affected the joint innovation process in the sense that these ties were used to form coalitions, influence opinions, access strategic information, involve parties and/or reach consensus. However, existing ties were most relevant in the early innovation stages.
- *Heterogeneity* of the group involved in the idea and development phase of the innovation process increased the adoption basis of the innovation.
- Particularly in the initiation phase, actors with a *strategic position* in the network were in a better position to influence the direction of the innovation.
- The *presence of interpersonal trust* affected the joint innovation process in the sense that actors were more willing to take risks. In addition, the presence of trust appeared to be more relevant in the early than in the later innovation stages. Furthermore, a high level of trust resulted in efficient cooperation between the parties. Lastly, in some cases trust was predominantly based on the expertise of the other and not so much on the feeling that the other would act in an honest way.

8
The Maltese eID

The last case concerns the joint development of an eIDM system by Maltese government authorities, which is examined in this eighth chapter. As mentioned in the last section of chapter four on the methodology of the present research, the empirical chapters consist of four main parts. The introductory section describes the innovation process chronologically along the innovation stages (initiation, development, implementation and diffusion). Conclusions are drawn regarding the application of strategies, decision making and the outcome and impact of the innovation. The second section presents evidence found regarding the impact of Advocacy Coalition Framework parameters and events. Each sub-section draws a conclusion about the specific effects of the variable. The influence of social capital variables is explored in the third section. For the five dominant network and tie characteristics (network closure, strength of ties, heterogeneity, broker's position and levels of trust) an overview is provided of the perceived impact by involved actors. The sub-sections of this third section conclude with an overview of the key impacts of the specific variable. The fourth (and final) section draws conclusions regarding the influence of the framework variables.[321]

8.1 INTRODUCTION

This first section examines the successive innovation stages of the Maltese eIDM system. For each innovation stage (initiation, development, implementation and diffusion), the most important actors involved, strategies applied and decisions made, are described. The last part of this section provides a summary of the key actors, strategies and decisions, and provides insight into the outputs and impacts of the innovation process.

8.1.1 Initiation phase

The foundation for e-Government projects was laid down in the Maltese Information System Strategic Plan for public services in 1998.[322] This plan (which builds on

321 All websites mentioned in this chapter have been accessed between September and December 2009.

322 http://www.eu-esis.org/esis2prom/MTprom1.htm

the IS Strategic Plan of 1990), proposed the primary efforts directed at a process of consolidation, maximisation and optimisation of the public sector information systems.[323] The plan stressed that information systems and technology are not an end, but a means for achieving effective and efficient attainment of public service delivery and that a pragmatic approach should be taken. One of the interviewees stated about the onset of e-Government policy in Malta: 'I have been involved [in e-Government policy] from the very beginning. In 1998, David Spiteri Gingell was the head of the Management Efficiency Unit within the Office of the Prime Minister. He was responsible for defining and taking forward the key initiatives recommended in the Strategic Plan. He was also the chairman of the drafting committee for cyber legislation. He set up the legal framework in the data protection and electronic commerce act. […] We needed a political champion, and therefore David approached Austin Gatt, who back then was the parliamentary secretary of the prime minister. Gatt was interested in David's plans, and some time later [1999] he became Minister for Justice and Local Government. Meanwhile, David and I prepared a white paper on e-Government.'[324]

This e-Government white paper was published in May 2000. In the document, the Maltese government announced their plans to implement a PKI-based electronic identity management system (Ministry for Investment, Industry and Information Technology, 2000).[325] The document states that: 'Public Key Infrastructure (PKI) is the technology that is currently being adopted worldwide for the provision of online security and personal authentication. […] Public Key Infrastructure is recognised worldwide as the current most secure alternative for the provision of secure online services, and individual signature authentication and non-repudiation.' The plan argues that the most optimal scenario for the Maltese situation would be a centralised PKI system, serviced by one certification authority (CA) that would attend to the certification of all individuals and organisations related to e-Government services. In addition, the Maltese government proposed in the plan to set up a policy management authority to establish policies, provide approval and make decisions on the nature and operations of the Government PKI (Ministry for Investment, Industry and Information Technology, 2000:29).

With regards the use of smart cards, it is stated in the document that: 'We should [...] explore the best way forward in the short term, which is likely that of data encryption and authentication without the use of smart cards, and study developments on the latter for potential introduction a few years down the line. Transaction services to be implemented will therefore be accessible via PKI and use of the private key will entail the input of a PIN, or personal identification code. Work on the security features will be among the first tasks to be addressed.' In their policy vision, the Maltese government did not exclude the possible future use of smart cards but chose a pragmatic approach at first with a less complex PKI system. The

323 http://www.comnet-it.org/pubs/newsletter/issue5/review.html

324 For more information on Austin Gatt, see http://www.doi.gov.mt/EN/ministries_and_departments/justice.asp

325 Ministry for Infrastructure, Transport and Communications, 'e-Government vision, 2000', https://mitc.gov.mt/MediaCenter/PDFs/1_e-Gov%20Vision%202000.pdf

Maltese government decided to start an eID programme, which consisted of four phases of PKI implementation, in which a four-tier authentication assurance classification would be implemented.[326] These four levels are:

- Level 0: no authentication
- Level 1: restricted authentication (login, password and PIN)
- Level 2: confidential authentication (digital certificate)
- Level 3: maximum authentication (qualified digital certificate)

8.1.2 Development phase

After the elections in April 2003, Austin Gatt became Minister of Information Technology and Investments at the Ministry for Investment, Industry and Information Technology (MIIIT). One of the respondents stated: 'Between 2000 and 2003, there was a lot of friction. Gatt was Minister for Justice and Local Government and wanted to push e-Government. However, overall e-Government policy remained in the hands of the Prime Minister's Office. […] Gatt's move from the Ministry of Justice to MIIIT in 2003 created new momentum for e-Government, and since he [Gatt] was now in charge of IT policy again he could start pushing it.' On 16 October 2003, Gatt announced that the Maltese government would start a programme to provide an electronic identity (eID) to each citizen in the country, designed to enable secure access to e-Government services.[327] Gatt stated that the future electronic ID would enable Maltese citizens to access a number of interactive and transactional e-services, such as income tax or VAT payments, registration for social services and access to healthcare services. Citizens would also be able to access their personal data held by public administrations over the internet. The minister described this electronic identification system as the last pillar in the building of e-Government, and said it would give a decisive boost to the development of e-Services. He argued that the new system would not only be used by government but would also be taken up by private companies.

The eID programme commenced right after Gatt's announcement and was led and coordinated by MIIIT. The first two authentication levels (0 and 1, see sections above) were developed in partnership with Microsoft and Exigy, a local IT solutions company.[328] One of the interviewees stated: 'In 2003, MIIIT made the strategic choice to make Microsoft's .NET Framework the standard for e-Government applications. […] Back then, Microsoft was not as big as it is today. MIIIT made a deal with Microsoft; Malta would buy all kinds of software from Microsoft, and Microsoft would develop the electronic identification system for free. Microsoft hired Exigy, a company with three employees, for the development of the eID system.' Another respondent stated: 'It was all new to us; we had to develop new software. There was great pressure from MIIIT's head of staff of MIIIT to deliver as soon as possible. […] The Ministry for Social Policy was involved since they would be the first service provider to use the eID system.'

326 IDABC, European e-Government Services, 'eID Interoperability for PEGS, National Profile Malta', http://ec.europa.eu/idabc/servlets/Doc?id=31540

327 ICA 38th Conference, ICA Country Report, 2004, Malta, Cyprus, October 2004.

328 http://www.epractice.eu/node/277428

In spring 2004, a call for tenders was issued for companies interested in providing levels 2 and 3 of the eID programme, which consisted of the development of certificates and the registration and certification of eIDs.[329] In June 2004, the Accerta consortium - consisting of Fenlex Corporate Services Ltd and the two IT services companies, Datatrak IT and Computime – was awarded the tender.[330] The local councils were involved for the issuing of eIDs. In 1999, these local councils were established by law,[331] and the government wanted to empower the councils by involving them in e-Government programmes.[332] In December 2004, the first e-services were made available to citizens by the Ministry for the Family and Social Solidarity, allowing citizens to access their social security records and make related transactions.[333] The authentication level of this e-Service was 1 (developed by Microsoft and Exigy) and consisted of a login, password and PIN.

Although MIIIT's initial idea was to have the Accerta consortium function both as certification authority and registration authority, according to several interviewees, MIIIT decided in 2006 to delegate the establishment of a certification authority to the Malta Information Technology and Training Service (MITTS) Ltd. The reason for this was twofold: firstly, MIIIT expected that they could save costs (as the government was not aiming to make profit) and secondly, based on further consideration, they did not want a private entity to handle sensitive citizen data.[334] A few months later, the Registration Authority (RA) was also taken over by MITTS, since the initial division of responsibilities – in which local councils had a powerful role – appeared not to work properly (e.g. due to a lack of skills at the local level, according to interviewees).[335]

8.1.3 Implementation phase

For the broad implementation of the eID solution, a revised agreement between the main stakeholders was made based on functional specifications[336] and was treated as a programme consisting of several projects. One of the respondents stated: 'After we decided to have both the certification and registration authorities

329 http://www.fenechlaw.com/news/index.cfm?ID=11
330 http://www.fenechlaw.com/news/
331 Malta has 68 local councils – 54 on the mainland and 14 in Gozo, the sister island. In December 1999, the Local Councils Act was considerably revised and published as Act. No. XXI (1999), the Local Councils (Amendment) Act 1999. See http://www.lca.org.mt/pages/iseSinglePages.asp?m=20, http://www.epractice.eu/node/277428, http://www.snapadministration.com/snapdatafiles/files/Exigy/633440372170182500.pdf
332 See also http://www.epractice.eu/en/document/288315
333 http://www.msp.gov.mt/ministry/content.asp?id=684
334 http://www.snapadministration.com/snapdatafiles/files/Exigy/633440372170182500.pdf
335 Malta has 68 local councils – 54 on the mainland and 14 in Gozo, the sister island. In December 1999, the Local Councils Act was considerably revised and published as Act. No. XXI (1999), the Local Councils (Amendment) Act 1999. See http://www.lca.org.mt/pages/iseSinglePages.asp?m=20, http://www.epractice.eu/node/277428, http://www.snapadministration.com/snapdatafiles/files/Exigy/633440372170182500.pdf
336 http://www.epractice.eu/node/277428

within the government, we had to revise the agreements with our suppliers.' The following division of tasks and responsibilities was made:[337]

- MITTS Ltd was put in charge of setting up the PKI Certification Authority and later on also the Central Registration Authority in Valetta.
- Exigy Ltd was put in charge of the eID and portal development.
- Microsoft became the software provider.
- The Ministry for Investment, Industry and Information Technology (MIIIT – later the Ministry for Infrastructure, Transport and Communications) acted as programme managers and were the entity responsible for the propagation of eID use within the government.

In 2007, the Government Certification Authority MECS Ltd (Malta Electronic Certification Services Limited) was established by MITTS (on behalf of MIIIT), whose task, up to this day, is to create and assign non-qualified certificates based on PKI technology.[338,339] In addition, two eID offices were established in September 2007 in Valletta and Rabat[340] to issue eIDs to citizens.[341] In September 2007, MITTS also published the Certification Policy for non-qualified certificates, a document defining the requirements for the certificates.[342] The Policy Management Authority was assigned charge of the Certificate Policy and is responsible for the administration of the Certificate Policy. The Certification Practice Statement (CPS) defines the practices and standards employed by MECS ltd for the issuing, withdrawing and publishing of digital certificates.[343]

According to several interviewees, service providers were reluctant to start using the eID solution. One of them stated: 'The Inland Revenue Department already had a solution in place. They used digital certificates for online services. […] Minister Gatt did not want to stop this development, but of course they [Gatt and the Minister of Finance] spoke about harmonisation. We [Malta Financial Service Authority] also needed digital certificates and did not want to wait for MIIIT, so we decided to use the Inland Revenue Department's certificates. We needed the certificates because we need to guarantee our clients a certain level of security when they sign documents. The certificates were from VeriSign. When MIIIT's system was ready, we started using it.' Several other interviewees mentioned that in order to deal with the reluctance of service providers, the government published a circular obliging all ministries and municipalities to use the national eID system for electronic identification purposes. One respondent, for instance, explained: 'We had some important problems getting service providers involved. We did not involve the key stakeholders in time, and thus some of them were reluctant to join. But the Prime Minister's Office published a circular and forced all service

337 See also http://www.epractice.eu/node/277428
338 http://www.mca.org.mt/infocentre/openarticle.asp?id=907&pref=15
339 http://ec.europa.eu/idabc/servlets/Doc?id=32347, Non-Qualified.
340 https://mitc.gov.mt/page.aspx?pageid=81&dispLang=1
341 https://mygov.mt/portal/(fc0rymvr0go1ts45zubads45)/webforms/howdoigetaccesstomygov.aspx
342 http://ictpolicies.gov.mt/docs/GMICT_P_0061_Certificate.pdf
343 http://repository.ca.gov.mt/Certification%20Practice%20Statement.pdf

providers to use the eID solution to align themselves with the eID solution.' And another interviewee: 'A circular was published that said all government entities should use the eID. It was a package of some key components, such as eID, SMS gateway and payments.'[344]

After the circular was published, the joining up of service providers increased. In September 2007, Minister Austin Gatt of MIIIT unveiled the central portal to Maltese e-Government services, mygov.mt.[345,346] through which several e-services were available:[347]

- Matters related to income tax and falling under the jurisdiction of the Department of Inland Revenue, including electronic income tax returns, tax reduction forms, corporate tax returns, employers' social security contributions.
- The sending of official examination results by the Department of Education to students via mobile telephony, as well as online applications for exams.
- Online submission of VAT returns, as well as facilities for viewing balances for tax periods and registration of VAT numbers through the VAT Department.
- Online application and renewal of passports.
- Online filing of police reports.
- Online application and renewal of vehicle licences.
- Online application for building permits issued by the Maltese Environment and Planning Authority.
- A number of social services applications and statements launched by the Ministry or the Family and Social Solidarity.
- Online registry of companies, launched by MFSA which also caters for electronic incorporation of companies and electronic filing of company accounts.

8.1.4 Diffusion phase

Since 2008, Maltese government has focused on a broader diffusion of the eID application among service providers and a further development of the eIDM system. Preparations are being made by the Malta Information Technology Agency (MITA) (which replaced MITTS in 2008) and MITC (the Ministry for Infrastructure, Transport and Communications, formerly MIIIT) to introduce electronic passports.[348] The contract to develop the electronic passports and border control system were awarded to the company De La Rue.[349] According to MITC, these passports will include an RFID chip that stores people's facial image, which will be secured using country signing certificates issued by the Country Signing Certification Authority.

344 Circular 15/2007 from the Office of the Prime Minister giving direction on the 'Usage of Electronic Identity Management Tools'. Circular 15/2007 contains the following directive: 'The eID shall be considered to be the exclusive and single means of electronic authentication and signing for all and any government services.' It thus ensures that e-Government users do not need a different authentication token for each service.

345 http://www.epractice.eu/en/document/288319

346 http://en.wikipedia.org/wiki/Austin_Gatt

347 https://www.cosic.esat.kuleuven.be/modinis-idm/twiki/bin/view.cgi/Main/MalteseProfile

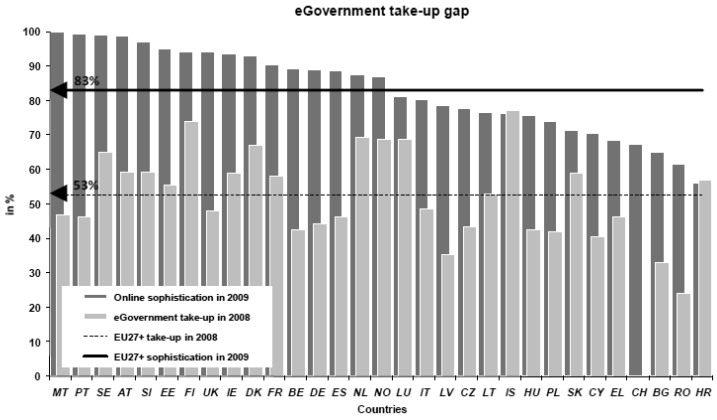
348 https://mitc.gov.mt/page.aspx?pageid=81&dispLang=1

349 http://www.prnewswire.co.uk/cgi/news/release?id=242441

The successive phases of the project are intended to introduce Extended Access Control Passports, which will include fingerprint images, and the installation of a border control system capable of reading biometric passports from other countries.

In 2009, a benchmark of the European Commission[350] revealed that whereas the number of public services available online is high in Malta compared to other member states (Malta was ranked first on full online availability of online services), as is the sophistication of services, take-up by citizens seems to lag behind. The table below shows that in 2008 the take-up of e-Government services was below the EU27+ average.

Table 7. e-Government sophistication and take-up in EU member states 2008, European Commission



One of the respondents stated about the take-up: 'The take-up of e-services and eID is relatively low. Application for an eID requires individuals to physically go to an eID office, register and activate the eID at home, which is perceived by citizens as being cumbersome. User surveys have indicated that the burden inhibits the take-up of e-Government services.' Government officials expect the take-up to increase when the electronic passports are introduced as these are mandatory in Malta. However, the ownership of an electronic passport does not automatically imply the use of the passport to obtain electronic services. Several interviewees have stated that take-up remains an important challenge of e-Government policy. Another study by the European Commission[351] demonstrates that people who

350 European Commission, Directorate General for Information Society and Media, (2009), 'Smarter, faster, better e-Government', 8th Benchmark Measurement, Brussels.

351 IDABC, (2009), 'European e-Government Services', Study on Mutual Recognition of eSignatures: update of Country Profiles, Malta country profile, Brussels. The report also states that: 'To date, no specific e-Government applications using electronic signatures have been deployed.'

use the eID application do so predominantly for authentication and not for the signing of documents. The report states that: 'The use of e-Signatures in Malta, although fully recognized at law, is still at its early stages. Whilst the Government of Malta has launched the eID as a software-based solution including a non-qualified certificate based on PKI technology and capable of producing advanced electronic signatures, such certificate is mainly used for authentication purposes and not for signature purposes.'

Currently, the eIDM policy of the Maltese government focuses on cross-border integration. One of the key projects is the integration of the departmental systems into a common system, with a common infrastructure and administration across the government. This programme is being carried out largely by MITA. Today, local government (local councils) are involved only in certain tasks.[352] One such task is the online option of renewing vehicle road licences, paying outstanding contraventions and checking when the next vehicle roadworthiness test is. The web application used for these tasks (called eVERA) is integrated into the Local Enforcement System (also managed by local councils) and allows on-duty traffic wardens to register and manage traffic contraventions of various kinds.

8.1.5 Conclusions

There have been several dominant actors in the innovation process of the Maltese eIDM system. The Management Efficiency Unit (MEU) within the Office of the Prime Minister developed the eIDM system's plan and legal framework. From 2003 to 2008, the Ministry for Investment Industry and Information Technology (MIIIT, and later on the Ministry for Infrastructure, Transport and Communications, MITC) was responsible for the management of the project. The Malta Information Technology and Training Service (MITTS), which was in charge of the setup of the PKI Certification Authority and the Central Registration Authority, and the Malta Information Technology Agency (MITA) took over the project management of MIIIT (now MITC) in 2008.

Tasks and responsibilities were not the only things to shift between different government bodies. Key public officials involved also moved from one organisation to the other. Moreover, it seems that eIDM policy shifted to new organisations in tandem with the shift of public officials. For instance, both Minister Gatt and Mr. Grech (public official who held the final responsibility of the project) changed organisations but remained responsible for the eIDM project. Furthermore it appears that – compared to the eIDM strategy applied in the other cases (Austria, Belgium and Finland) – in Malta the strategy was relatively rudimentary and changed several times. Whereas the initial idea was that the certification and registration would be carried out by a private party, the Maltese government decided in 2006 to assign these tasks to a public organisation. In addition, several involved respondents stated that it was not clear to them during several stages of the in-

352 See also http://ec.europa.eu/idabc/servlets/Doc?id=31540

novation what the exact features of the eIDM system were, neither the necessary steps to realise the solution.

Regarding the innovation output it seems that the Maltese government has a fairly mature eIDM system in place and that many government services are available through the system. However, it appears that the use of the eIDM system lags behind expectations and that the impact of the system is therefore limited. Although there are no statistics on the use of the eIDM system publicly available, research on the take-up of electronic services and interviews on the perceived take-up of the eIDM system indicate that the take-up of the eIDM system is quite low.

8.2 PARAMETERS AND EVENTS OF THE ADVOCACY COALITION FRAMEWORK

The influence of the Advocacy Coalition Framework parameters and events are explored in this section. An assessment is made for each parameter and event to discover whether and how the parameter or event affected the joint innovation process.

8.2.1 Attributes of the good

The Maltese eIDM system (currently) consists of two levels. Level one has been built on Microsoft Windows Server 2003, and level 2 consists of a Public Key Infrastructure hierarchy.[353] Whereas level one consists of a relatively simple combination of username, password and PIN, the second level works with more complicated non-qualified certificates. At the top or root of the PKI hierarchy of the second level, there is the 'Government of Malta Root CA', the purpose of which is to build trust in the underlying PKI hierarchy within the government domain. The self-signed 'Government of Malta Root CA' certificate certifies the private key of the 'Government of Malta Intermediate CA', the purpose of which is to segregate the lower tiers of the PKI hierarchy from the root. The 'Government of Malta Intermediate CA' certificate certifies the private key of the 'Electronic Identity CA', the purpose of which is to issue the certificates for subscribers.

The Malta Electronic Certification Services Ltd[354] (MECS Ltd) is the trusted agent responsible for all the PKI hierarchy established on behalf of the government of Malta under an agreement between the government of Malta and MECS Ltd. According to this agreement, MECS Ltd agrees to provide the certificate services. The CPS regulating the certificates issued by the government of Malta states that the certificate provides a medium degree of assurance of the electronic identity of a subscriber. The certificate ensures proper authentication since the individual applying for the certificate must go to the appointed registration authority (RA)

353 http://ec.europa.eu/idabc/servlets/Doc?id=32347
354 http://ec.europa.eu/idabc/servlets/Doc?id=32347

in person for official registration before a certificate can be issued by the government certification authority (CA). For applications pending validation, the person applying for the certificate must present his/her identity card for verification. Certificates are not issued to individuals acting on behalf of a legal person, are personal to the relevant subscriber and they are non-transferable.

A person applying for a digital certificate must have previously obtained an Electronic Identity Account (eID), in accordance with the procedures and terms and conditions for obtaining such an account. Only Maltese citizens and residents can apply for an eID and digital certificate. An individual applying for an Electronic Identity Account must go in person to the appointed RA, taking along the following documents:

- The order form, which must be duly filled in and signed.
- The applicant's valid identity card, passport or equivalent official document.

The RA approves an application for an Electronic Identity Account upon the successful identification and authentication of all required subscriber information. The Registration Authority rejects an Electronic Identity Account application if identification and authentication of all required subscriber information cannot be completed, or if the applicant fails to furnish supporting documentation upon request.

Once the applicant obtains the account, upon successful login to the mygov.mt portal, an online facility is provided to apply for a digital certificate. The certificate applicant is required to read and understand the subscriber agreement provided online, and the certificate application is completed once the terms and conditions are accepted. The certificate applicant then generates the key pair and sends a certificate request to the RA. The RA verifies the physical identity of the certificate applicant by ensuring the personal information provided for the Electronic Identity Account application is still true and correct. The RA sends its approval of the certificate application to the CA using the facilities provided by the CA upon the successful identification of the applicant. The RA may reject the application for a certificate if this may bring the CA or the government of Malta into disrepute.

Several interviewees have stated that because the required features of the eIDM solutions were not clear in the development phase of the application, this put pressure on the subsystem and hampered the innovation process. In other words, not the attributes of the innovation, but the lack of clarity on the attributes affected the dynamics of the subsystem. As one of the respondents stated: 'They [MIIIT] just did not know what they wanted. They did not have any knowledge on eID and this made the process really difficult. We never knew what the next step in the project would be. […] As the government changed plans all the time, the innovation process slowed down.'

Furthermore, various studies demonstrate that although the sophistication and availability of online services is relatively high in Malta, the use of eID to obtain

e-Government services is below the European average.[355] These findings are confirmed by statements made by respondents. According to several interviewees, the limited take-up can be explained by the cumbersome process of obtaining an eID. One of the involved persons, for instance, stated: 'The application for an eID requires individuals to physically go to an eID office, register and activate the eID at home, which is perceived by citizens as being cumbersome. User surveys have indicated that the burden is an inhibitor to the take-up of e-Government services.'

Overall, the lack of clarity during the development process regarding the attributes of the solution appear to have slowed down the innovation process and the features of the system implied limited willingness of users to adopt the system during the implementation and diffusion process.

8.2.2 Basic distribution of resources

Although formal documents regarding the financing of the eID are not available to the public, the interviews reveal the following allocation of resources:

- Several respondents stated that for the development of level 1 authentication, MIIIT and Microsoft agreed that MIIIT would purchase a variety of software for around 3 million euros and that Microsoft would develop the level 1 authentication for free (the development costs of which were around 700,000 euros).
- Interviews reveal that MIIIT and Accerta came to an agreement that Accerta would fund the implementation of the registration and certification authority, and that Accerta would be paid in the take-up phase, namely 2 euros for each registration (with a total population of around 400,000 people, the maximum amount would be around 800,000 euros).

The involved parties stated that the development of authentication level 1 was part of a broader deal between MIIIT and Microsoft in 2002. One of the interviewees stated: 'The business case for Microsoft was that they would get an enterprise agreement for the whole Maltese government. In exchange for that we got the eID part for free. They actually funded the ID technology themselves. Microsoft brought in a local partner, Exigy, who customised the Microsoft software. […] The [eID] technology was developed by Exigy, and MITA got 50% of the intellectual property rights.' Another interviewee stated: 'Exigy was hired by Microsoft, who reinvested [in eID] as they had a strategic alliance with the government. […] About 3 million euros went to Microsoft and around 700,000 euros was reinvested by Microsoft in the eID project.' A third interviewee reported about this deal with Microsoft: 'I was never happy with the way it [the contract with Microsoft] was organised. It was not clear who was responsible for what. […] The funding was a by-product of something else. There was not a clear contract with Microsoft on the eID project.' Interviews reveal that the chosen financial model had an effect on

355 European Commission, Directorate General for Information Society and Media, (2009), 'Smarter, faster, better e-Government', 8th Benchmark Measurement, Brussels.

the subsystem in the sense that the relationships were not clear and there were continuous negotiations.

The financing of the Accerta consortium evoked several conflicts within the subsystem. The Accerta consortium and the Maltese government agreed that the Accerta consortium would be paid 2 euros for every eID registration of a citizen. However, due to several problems, the take-up of citizens lagged behind expectations and thus also the financial pay-off for the Accerta consortium. One of the interviewees stated: 'We invested: we went abroad for trainings, we learned about the technology and provided documentation, but we did not get paid for it. The payment would have been further down the line, when citizens would start to register. But the take-up was low and still is.' Another involved person reported: 'The financial model was simple, we would be paid a few euros for each registration. […] When we made the deal we were quite confident that we would be paid and made some substantial investments. For two years, I spent about 40 to 60 percent of my time, on the eID project without being paid. It was very frustrating, and our consortium was really trying to push the project, but it did not work out.' This financial model led to some major conflicts between the consortium partners and the government, which in turn slowed down the innovation process. On the other hand, there was a major incentive for the consortium parties to realise a high number of registrations in a short period of time.

To summarize, the financial agreements made between the suppliers and the Maltese government to develop and implement the eID solution led to uncertainties on both sides, to continuous negotiations and several conflicts. The constructions put pressure on the development team. On the one hand, the conflicts slowed down the innovation process, and on the other hand the financial model yielded a major incentive for suppliers to deliver as many registered users as possible, as quickly as possible.

8.2.3 Fundamental cultural values

Dominant values shared by the actors of the subsystem are best revealed by key documents written by subsystem actors. The most important document that reveals the underlying values of the eIDM innovation is the e-Government white paper, published in 2000.[356] Mission statements in the document repeatedly mention several core values. Firstly, it is recurrently argued in the white paper that the Maltese government wants to belong to the international group of front-runners. For example, the introduction to the paper states that: 'There is a realisation that there can be no falling behind. […] Where is Malta situated in the current scenario? Not in the front line, unfortunately, although the situation is not yet critical. We are several years behind most of our forthcoming European partners in the field of ICT and need to exponentially accelerate the process.' And the following goal is formulated in the part of the document that outlines the vision (pages 4 and 5): 'Malta will be with the front-runners: Malta will be a fully-fledged member

356 https://mitc.gov.mt/MediaCenter/PDFs/1_e-Gov%20Vision%202000.pdf

of the global information society, capable of interacting and competing on equal footing with the rest of the world.'

Another core value revealed by the document is the perceived added value of e-Government and hence eIDM systems for Maltese citizens. In this respect, the most important public value mentioned is convenience for citizens. For example, the following contention regarding the future is made in the paper: 'Citizens will benefit from one-stop, timely, high-quality and easily accessible electronic services provided by both the Public and the Private Sector. The Government will provide its services over the Internet and Citizens will be served in the comfort of their homes at whatever time of day, while still opting to utilise traditional service channels if they so desire. Businesses will also offer their services to consumers over the Internet on a 24x7 basis.' And more generally it is stated that: 'The convenience that electronic services entail to the client, and their cost-effectiveness to the supplier, inevitably make the Internet a very attractive channel for service provision.'

Compared to the visions charted out in documents from other cases, the strong economic view applied in the paper is also significant. Although it is an e-Government vision, major attention is paid to the future opportunities of e-Commerce, and the e-Government project is also perceived to contribute to a stronger Maltese economy. For example, it states that: 'This proposal charts out a Vision and strategy for attaining eGovernment in Malta – which is, ultimately, highly dependent on the engendering of an Information Society and Information Economy in Malta.' Furthermore, as regards e-Commerce it is argued that: 'The emergence of e-Commerce is a critical issue facing our economy. Malta must become aggressive in determining the right conditions for e-Commerce, which is an important driver of economic growth. The 1999-2001 ISSP recognised this necessity and targeted the achievement of On-line Government as one of its major thrusts.'

Lastly, the paper repeatedly stresses the importance of cooperation between public and private parties. In addition, the government's role is defined as a facilitating one and is rather limited. The introduction to the document, for example, states that: 'It is emphasised that the achievement of these goals will require the concerted efforts of the Public and the Private Sector. The Government will be mainly concerned with ensuring the legal framework and the institutional set-ups required to create and promote the ideal environment. It will also adopt widespread e-Commerce solutions in its business-oriented activity, such as procurement, so as to encourage its widespread usage. The private sector will undertake the necessary activity in providing, as well as in adopting, the IT and business solutions that will be in widespread demand throughout the economy. In this respect the venture leading Malta into the Information Age must be a Public/Private partnership.'

The interview reports reveal that these core values have had a significant influence on attempts to address the need for eIDM and the division of tasks between involved parties. One of the interviewees stated, for instance: 'We [the Manage-

ment Efficiency Unit – MEU] wanted to be among the most advanced technological countries in the world. This was not only something we [MEU] highly valued, but also top officials. I guess, as a small country, we all strive to belong to the group of international leading parties. Not only government, but also businesses. […] The fact that we found it important to be ranked among the top-10 European countries as regards e-Government and eIDM achievements provided a decisive boost to the project.' The fact that the actors of the subsystem found it important to limit the role of government and seek a public-private partnership shaped the divisions of roles between parties of the subsystem. One of the interviewees, for instance, stated: 'Initially the idea was that private parties would take care of the registration and certification. The motto was: what can be done by private parties, should be done by private parties. […] However, over time we [MITTS] came to the conclusion that this [public-private] construction was not working and took it over.'

In conclusion, core values have had a significant influence on the initiation of the eIDM and the initial division of roles between involved parties.

8.2.4 Basic legal structure

The main legal framework for the Maltese eID solution consists of the following legislation:[357]

- The Identity Card Act of 1975,[358] which states that all Maltese citizens over the age of fourteen are required to have an identity card. Although the act does not have any provision relating specifically to the eID card, it is stated in the act that the identity card may 'include a limited area where machine readable coded information may be inserted', the formulation of which can serve as a basis for electronic card use.[359]
- The Data Protection Act of 2001,[360] which protects individuals against privacy violations by the processing of personal data and against any related matters. Under the Data Protection Act, an ID card number, which is a unique identifier for every person in Malta, in the absence of consent, can only be processed when such processing is clearly justified with regard to: a) the purpose of the processing, b) the importance of a secure identification, and c) any other valid reason.
- The Electronic Commerce Act,[361] which entered into force in 2002, lays down the main regulatory framework encapsulating e-Commerce legislation and was modelled on the law for Electronic Transactions and the EU Directives for Electronic Commerce and Electronic Signatures. The e-Commerce Act establishes the legal equivalence of paper-based transactions with electronic ones, the parameters within which electronic contracts are to be concluded,

357 http://ec.europa.eu/idabc/servlets/Doc?id=31540
358 http://docs.justice.gov.mt/lom/legislation/english/leg/vol_6/chapt258.pdf
359 http://ec.europa.eu/idabc/servlets/Doc?id=31540
360 http://www.dataprotection.gov.mt/dbfile.aspx/DPA.pdf
361 http://docs.justice.gov.mt/lom/legislation/english/leg/vol_13/chapt426.pdf

and the regulatory frameworks for the provision of electronic signature certification and intermediary services.

- The Electronic Communications (Income Tax) Regulations[362] of 2002 constituting the legal framework to support the validity of some electronic services that can be provided by the Inland Revenue Department.
- The Public Contracts Regulations: Legal Notice No. 177 Public Contracts Regulations 2005 and Legal Notice No. 178 Public Procurement of Entities operating in the Water, Energy, Transport and Postal Services Sectors Regulations, 2005 both published in the Government Gazette No. 17775 dated 3rd June 2005. These Legal Notices complete the legislative framework for the use of electronic signatures in public procurement and provide the opportunity to use electronic auctions and dynamic purchasing systems.
- Circular 15/2007 from the Office of the Prime Minister containing the directive on the 'Use of Electronic Identity Management Tools'. Circular 15/2007 contains the following directive: 'e-ID shall be considered to be the exclusive and single means of electronic authentication and signing for all and any government services', and thus ensures that users of e-Government do not need a different authentication token for each service.

The large majority of respondents stated that there were no major discussions on the legal framework, but that the liability of the Maltese government has been an important issue. One of the respondents stated about this: 'After some time we came to the conclusion that – from a liability perspective – it was not desirable if the RA or CA were private organisations. As a government, we would have ultimate responsibility for these organisations' actions, and we were not confident about the arrangement we had with them. […] For us this was a major risk and therefore we decided to incorporate the RA and CA into government.' One of the respondents stated about the legal framework: 'He [David Spiteri, head of the Management Efficiency Unit in the late 1990s] was also the chairman of the drafting committee of cyber legislation. He set up the legal framework; the data protection and electronic commerce act. There were no major issues during the drafting of the legislation. […]The drafting process was swift and the legislation passed the chamber quite smoothly.'

Several interviewees stated that an important regulation that significantly affected the involvement of service providers was a circular from the Prime Minister's Office that obliged all ministries and municipalities to use the national eID system for electronic identification purposes.[363] One respondent, for instance, explained: 'We had some important problems getting service providers involved. We did not involve the most important stakeholders in time, and thus some of them were reluctant to join up. But the Prime Minister's Office published a circular and forced

362 http://docs.justice.gov.mt/lom/Legislation/English/SubLeg/372/23.PDF

363 Circular 15/2007 from the Office of the Prime Minister giving direction on the 'Usage of Electronic Identity Management Tools'. Circular 15/2007 contains the following directive: 'The eID shall be considered to be the exclusive and single means of electronic authentication and signing for all and any government services.' It thus ensures that e-Government users do not need a different authentication token for each service.

all service providers to use the eID solution to align themselves with the eID solution.' And another interviewee: 'A circular was published that said that all government entities should use the eID. It was a package of some key components, such as eID, SMS gateway and payments.'

In conclusion, circular 15/2007 from the Office of the Prime Minister particularly impacted the dynamics of the subsystem in the sense that service providers became obliged to cooperate. In addition, liability issues affected the division of eIDM responsibilities since the government decided to shift certification and registration responsibilities from private to public authorities.

8.2.5 Changes in socio-economic conditions and technology

During the development, implementation and diffusion process of the Maltese eID system, one of the most important changes in the socio-economic conditions of the Maltese society was the burst of the internet bubble in 2001. Although the annual GDP growth in 2002 was still 2.6%, in 2003 and 2004 it decreased to 0.3% and 0.4%, respectively.[364] The Maltese economy recovered in the years 2004 to 2007 with respective growths of 4.1%, 3.8% and 3.7%.

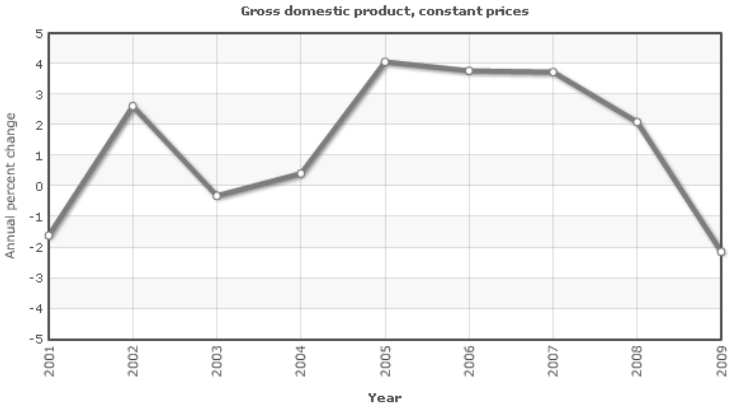


Figure 9. Maltese gross domestic product, 2001-2009

A second, technology-oriented change was the evolution of the eIDM technology applied. Whereas in the 1990s, several eIDM technologies were relatively immature and had limited availability, today most of these technologies are widely used and mature. For instance, in the late 1990s, the costs of card readers were relatively high, they could only be purchased at a very limited number of companies and the software that supported the card readers suffered from teething

364 http://www.indexmundi.com/malta/gdp_real_growth_rate.html

problems.[365] Today, many companies sell card readers for much lower prices, and the use of card readers has substantially increased.

A last major socio-economic change is the current economic crisis. Although the opinions of economists on the precise impact of the current economic crisis differ substantially, no one would argue that we have not been in a global economic recession since 2008. In Malta the GDP growth was 2,1% in 2008 and -2,2% in 2009 (see figure 9 above).

The majority of respondents stated that the burst of the internet bubble did not affect the eID innovation process. One respondent, for instance, stated: 'In the years after the internet bubble burst, in 2003 and 2004, deals were made with Microsoft and Accerta that they would deliver the development and implementation for free. This strong negotiation was not caused by the economic recession; it is just the way he [the top official responsible] works. Accerta would be paid in the take-up phase. So at that time there were no major government budgets for eID.' Another respondent argued: 'I do not think that the burst had any effect. The government always has a lack of resources, and it is just a matter of priorities. Gatt [Minister of Information Technology] was really pushing eID so it would be realised anyway. […] Our head of staff is a strong negotiator and achieved some good deals with the suppliers.'

Furthermore, according to the majority of interviewees, technological changes did not severely affect the innovation process since the Maltese government applied a pragmatic approach that allowed for the integration of new technologies. One respondent: 'I really think this is an advantage of our approach. We had four levels of eID development, starting with no authentication at all, then a low-security level solution, then the PKI solution and the integration of smart card technology was optional. The fact that we used this development model gave us the flexibility to adopt and incorporate new technologies.'

The majority of interviewees do not expect the current crisis to have a major impact on the eID innovation process. One of them explained: 'The contracts for the electronic passport have been arranged already. It is now a matter of carrying out the project. […] I do not think that any major investments have to be made in the coming years. […] What might have an impact is the fact that Gatt's priorities have changed [now that he is Minister for Infrastructure, Transport and Communication] and e-Government is not as important as it was at the beginning of this century.'

To summarize, the majority of respondents stated that the burst of the internet bubble did not have an effect on the project, nor do they expect the current economic crisis to have an effect either. In addition, several interviewees stated that

365 This was not only the case in Malta, but also in other countries. See, for instance, Srivastava (2005).

technological changes did not affect the innovation process since the Maltese government used a relatively open model.

8.2.6 Changes in public opinion

Public opinion on the Maltese eIDM system is most clearly voiced in the media, such as national newspapers. Over time, several newspapers have published articles on the project.

In the early years of the development of the Maltese eID system, there were not many newspaper articles on the project. L-orizzont[366] published several, more general articles on e-Government. In November 2003, for example, the newspaper published an article on the reduction of the budgets of the local councils (among which the e-Government budgets), and in March 2004 there was a critical review of the internet access points established at the council level. The article argued that the councils had too little influence on the allocation of resources, that they should have the authority to decide for themselves how to spend their budget. According to the journalist, the councils would probably have chosen not to invest in internet access points – which were not used by the public – but in other infrastructural projects.

In 2006 and 2007, The Malta Independent[367] published several articles on the position of Malta in European e-Government benchmarks. In July 2006, the newspaper reported that Minister Gatt stated that Malta held second place in the 'Online Availability of Public Services' report regarding e-Government services and third regarding the sophistication of IT services. In September 2007, The Malta Independent wrote that Malta had retained its leading EU ranking in the European Commission's annual report on e-Government. In August 2007, the newspaper reported on a testimony of the top administrator Mr. Grech, who was responsible for e-Government policy (including the eIDM project), assistant to Minister Gatt and the chairman of the adjudicating committee for the IT tender at the Mater Dei Hospital. In light of his capacity as a public officer, one of the members of the committee was charged with accepting bribes, embezzlement and taking a private interest in the adjudication of tenders.

In 2008, several newspapers, including The Malta Independent, Malta Today[368] and L-orizzont, reported on what they called 'the MITTS scandal' and the Labour Party's call for Minister Gatt to resign. In September 2008, 20,000 email passwords were stolen from a government server at MITTS. Although the chairman of MITTS, Mr. Grech, and Minister Gatt initially denied that passwords were stolen, in October Gatt made a statement in Parliament admitting that they had indeed been stolen. Some newspapers questioned Gatt's decision not to ask for Grech's resignation since that would have been normal procedure for him with a top official under his

366 http://www.l-orizzont.com/
367 http://www.independent.com.mt/
368 http://www.maltatoday.com.mt/2008/10/19/t8.html

responsibility. In 2009 several newspapers, including The Maltese Independent, published some critical articles on the Maltese eID solution, for instance on the burden of obtaining the eID.

According to the majority of respondents, public opinion did not substantially affect the eID innovation process. One of them, for instance, stated: 'There was not much debate about the eID innovation. […] There were all kinds of other issues, for instance the hacking of the MITTS computers. This had an impact because politically it was highly sensitive. Security policy was enhanced at MITTS, but Gatt remained in power and the scandal did not affect the eIDM project.' Several respondents stated that citizens are not very interested in eIDM or related issues, such as privacy. One respondent, for instance, reported: 'Privacy, for instance, is not as much of an issue in Malta as it is in the UK. We have lived with identity cards for around 40 years and nobody is opposed to it. The government imposes cards on us, so we use them. […] Data protection law is not something the Maltese citizen is interested in. It is more of an issue in other countries.' And another interviewee: 'Data protection is not an issue in Malta; nothing has been written about it. They [the Maltese citizens] perceive it as just another law, so there is not so much buzz around it. I can only recall about three articles on the subject, but these were not critical articles, just reporting. About the fact that eID was being launched, for example, or that some lawyer had won a privacy case. But there were no real arguments.'

In conclusion, no evidence has been found to suggest that articles on e-Government and top officials involved in e-Government have significantly affected the dynamics of the subsystem of the eID innovation.

8.2.7 Systemic governing coalitions

During the innovation process, there have been several changes in the governing coalition. Firstly, while in the late 1990s the ministry responsible for e-Government policy was the Office of the Prime Minister, e-Government policy moved, after the 2003 elections, to the Ministry for Investment, Industry and Information Technology (MIIIT). Secondly, although the initial idea was to have local councils carry out the identification of citizens for the issuing of eIDs, MIIIT decided to centralise the registration (and thus identification) to two eID offices (in Valetta and Rabat) due to problems at the local councils. Thirdly, the central government decided to take over the certification and registration tasks that initially were assigned to private parties. Fourthly, in 2008 the e-Government policy went from the MIIIT to MITTS, which became MITA in 2008. The head of the e-Government unit of MIIIT, Mr. Grech, and his team also went to MITTS/MITA.

According to several interviewees, the shift of the e-Government policy from the Office of the Prime Minister to MIIIT implied a boost for e-Government projects as it reduced competition between ministries, and Minister Gatt showed great interest in e-Government. One of the respondents stated: 'Between 2000 and 2003 there was considerable friction. Gatt was Minister for Justice and Local Govern-

ment and wanted to push e-Government. However, eGovernment remained at the Prime Minister's office. […] Gatt's move from the Ministry of Justice to MIIIT in 2003 created new momentum for e-Government, and since he [Gatt] was now in charge of IT policy again he could start pushing it.'

Interviews reveal that the centralisation of the registration procedures may have created additional barriers for citizens to obtain an eID. One of the respondents, for instance, explained: 'The original idea was that the local councils would identify citizens; however, they did not have the expertise or facilities. An average council has about five employees, and they just could not do the job. […] This centralisation has created an additional barrier for citizens to obtain an eID since they have to travel to Valetta or Rabat.'

In addition, several respondents stated that the government take-over of certification and registration from private parties strengthened the government's position in their relation to suppliers. An involved actor: 'The fact that we [the government] got the CA and RA, strengthened our position in the innovation process. We regained control. We had the upper hand again vis-à-vis our suppliers. At the onset, the balance of knowledge was in favour of Accerta, but following the decision [to make CA and RA a government task] we had the knowledge again. We hired an Irish company specialised in CA and RA to counterbalance the power of Accerta.'

The majority of respondents agreed that the shift of e-Government policy from MIIIT to MITTS (and later on MITA) did not substantially affect the innovation process as the head of the e-Government unit of MIIIT, Mr. Grech, and his team also went to MITTS/MITA. One of the interviewees, for instance, stated about this change: 'Claudio became chairman of MITA and brought his team with him. For Claudio it was a promotion; he was politically appointed by Minister Gatt. In fact, the change did not affect the eID innovation process.'

To summarize, several changes in systemic governing coalitions affected the Maltese eID innovation process. The decision to make MIIIT responsible for e-Government policy reduced competition between ministries and allowed minister Gatt to put eID high on the political agenda. The centralisation of the identification process increased the threshold for citizens to obtain an eID. Furthermore, the decision to make the CA and RA government authorities changed the relationships in the subsystem since the government gained control over the project.

8.2.8 Policy decisions and impacts from other subsystems

Over time, there were three subsystems, the decisions, policies or strategies of which were related to the Maltese eIDM project, namely: the subsystem of local authorities, the (national) political subsystem and the European subsystem.

Firstly, regarding the subsystem of local authorities, the government stated in several policy documents that it considers local governments to be the kingpins of

e-Government.[369] In view of this, the Ministry for Justice and Local Government established a Local Electronic Policy[370] in 2002 aimed at offering accessibility to technology and service delivery via the front offices of local councils. The document entails a formal agreement between the councils and the central government. For instance, the policy made the following statements obliging local councils to do follow their directives:

- In view of this, it is proposed to include Local Councils as a core agency i.e. an entity that although operates in total independence from Government, follows the policies, guidelines and standards issued by the Central Information Management Unit. […] The conformance with these policies, guidelines and standards will provide Local Councils with invaluable expertise and professional technological frameworks. It will also give Councils the access to the gov.mt domain on the Government network.
- Through the partnership, Local Councils will have to follow a generic service charter which will be prescribed in the final agreement, which will serve to set minimum service levels. Local Councils will be encouraged to extend these levels accordingly with their capability of improving range and level of service delivery.
- Local Councils which participate in the e-Government initiative will ensure that they will provide suitable accessibility to the e-Government services either through the set up of internet centres in their localities or through the utilisation of wired schools or through the placement of e-Government kiosks in key locations in the locality.

The policy was implemented through a partnership between the government and the local councils, whereby Councils opting to participate were granted a series of benefits related to the proliferation of the information society.

Within the second subsystem, the (national) political subsystem, several issues were raised related to eIDM. The eIDM project was mentioned in several chamber debates.[371] In December 2004, the Labour Party posed questions about difficulties with the online payment of television licences, which they considered a step backward in e-Government policy.[372] In this debate, the Labour Party also posed questions about the progress of the eID project. The party said they did not receive any information about the second phase of the project, the implementation of non-qualified certificates. In November 2005, the Labour Party questioned the meeting of e-Government targets by MITI and asked how many Maltese citizens were using an eID.[373] The Labour Party also addressed the lack of coherence in MITI's e-Government policy. More questions on e-Government targets were posed by the Labour Party in November 2006.[374] The party questioned the min-

369 http://www.epractice.eu/en/document/288317
370 http://www.gov.mt/documents/Local%20Council%20Electronic%20Policy.pdf
371 See http://parliament.gov.mt/home
372 http://parliament.gov.mt/HorDocs/Leg10_2003/Debates/20041214_209d_par.doc, Seduta Nru. 209 It-Tlieta, 14 ta' Diċembru, 2004.
373 http://parliament.gov.mt/HorDocs/Leg10_2003/Debates/20051110_316d_par.doc, Seduta Nru. 316, Il-Ħamis, 10 ta' Novembru, 2005.
374 http://parliament.gov.mt/HorDocs/Leg10_2003/Debates/20061102_451d_par.doc, Seduta Nru. 451, Il-Ħamis, 2 ta' Novembru, 2006.

ister on the launch of the new government portal and 20 new e-services, which should have been implemented in early 2006. The Labour Party also criticised the absence of figures on eID use. The Labour Party praised the minister in September 2007 for Malta's second place in an EU benchmark.[375] However, it also questioned the foundation for the ranking. In November 2007, the party posed questions about the realisation of two online services that a Capgemini benchmark claimed were online.[376] On November 18, 2008, the Labour Party called on Minister Gatt to resign. The reason for this was the MITTS affair, the hacking of a MITTS server and theft of 20,000 email passwords and usernames.[377]

The third relevant subsystem is the European Commission. The European Commission has been involved in eIDM issues since the late 1990s. The Information Society and Media department has an e-Government unit, whose name changed in 2007 to 'ICT for government and Public Services'. The unit organises regular meetings with the e-Government subgroup representing all member states. In addition, the unit established expert groups, one of which is on eIDM. At the European level, there were several EU projects and directives on eIDM systems. In 1999, the European directive on electronic signatures went into force.[378] The directive laid down the criteria that form the basis for the legal recognition of electronic signatures. In 2004 and 2005, the European MODINIS Project aimed to assess, amongst other things, the status quo of eID systems in European member states and the exploration of possible European eID systems.[379] In 2005, IDABC's eID Interoperability for PEGS programme of IDABC was launched, the objective of which was to analyse the eID and authentication interoperability requirements.[380] In 2008, the STORK project was launched, which aims to establish a European eID Interoperability Platform that will allow citizens to establish new e-relations across borders by presenting their national eID.[381] In addition, Capgemini publishes an annual benchmark on e-Government progress in the European Union member states.

The majority of respondents stated that the influence of local councils on e-Government is relatively small. One of them argued, for instance: 'Malta is a very small island, with only about 400,000 inhabitants. It is like a city. The councils are just

375 http://parliament.gov.mt/Search/docs.aspx?d=Highlighter.aspx&e=DocId=21930&Index=D%3a%5cHOR%5cHOR&HitCount=33&hits=158c+1a00+1a06+1a14+1b44+1c88+1d22+1ec9+2665+2666+26e8+26e9+26f5+26f6+271d+2793+2805+2806+2819+2988+29a9+2a38+2ab6+2ac9+32e0+3426+3427+3663+3664+4974+4975+4c5d+4c62+, Seduta Nru. 555, It-Tlieta, 25 ta' Settembru, 2007.

376 http://parliament.gov.mt/Search/docs.aspx?d=Highlighter.aspx&e=DocId=22538&Index=D%3a%5cHOR%5cHOR&HitCount=13&hits=108b+1a46+1e40+2ba3+2be6+31aa+34d1+363a+363b+36d5+6d9b+6d9c+6eca+, Seduta Nru. 580, Il-Ħamis, 1 ta' Novembru, 2007.

377 http://parliament.gov.mt/Search/docs.aspx?d=Highlighter.aspx&e=DocId=24421&Index=D%3a%5cHOR%5cHOR&HitCount=17&hits=16+2f+4c+7f+16f+1fab+2117+329f+5d57+8091+85ea+891b+8937+893e+8957+8bc3+8c2c+, Seduta Nru. 57, It-Tlieta, 18 ta' Novembru, 2008.

378 http://europa.eu/legislation_summaries/information_society/l24118_en.htm

379 http://ec.europa.eu/information_society/eeurope/2005/all_about/modinis/index_en.htm

380 http://ec.europa.eu/idabc/en/document/6484

381 https://www.eid-stork.eu/index.php?option=com_frontpage&Itemid=1

front offices of the central government. They have about five employees and only operational tasks. Most of them do not develop their own e-Government policy.'

In addition, according to the majority of respondents, the chamber questions did not have a significant impact on the eID innovation. One of the respondents argued: 'Of course the MITTS scandal impacted the MITTS organisation, policy and employees. However, it did not affect the eID innovation project as such. […] Gatt's resignation could have impacted e-Government innovation since he was a real bulldozer and could make things happen, but he did not resign.' However, several respondents stated that the strong ICT push by Minister Gatt, and the fact that both the Labour Party and National Party were ICT-minded, supported the eID innovation. One of them stated: 'The political dimension worked in our favour: Minister Gatt is a political driver of IT in Malta. He was very close to the project as a champion, pushing resources, etc. In Malta, there is clear cross-party agreement that IT is not a controversial subject, and that it does not get lost in political discussions. IT is important for the country.'

The majority of respondents agree that the European Commission and Malta's entry into the European Union has had a supportive effect on e-Government and thus also eID. One of them stated: 'Malta joining the European Union was a broadly shared political priority. Malta wanted to belong to the European Union and to show – in every respect, thus also e-Government – that they could handle it. That they were equally advanced as other member states.' And someone else: 'European aspirations had a strong influence from a government point of view. We were quite actively participating in the EU process; it was a very strong driver. […] We defined e-Government purposes in such a way that we could be among the front-runners of the European Union by deploying as many eID-related services as possible.

In conclusion, it appears that neither the local authorities, nor the opposition party had a significant effect on the eIDM innovation. In addition, it seems that the minister responsible for IT pushed the eIDM innovation as well as European aspirations.

8.2.9 Conclusions

Regarding the parameters of the Advocacy Coalition Framework, it appears that three specific aspects influenced the characteristics of the subsystem, the dynamics of the subsystem and/or the outcome of the innovation.

- The lack of clarity regarding the *attributes of the solution* slowed down the development process, and the potential features of the system generated among users a limited willingness to adopt the system.
- On the one hand, conflicts about the *funding model* slowed down the innovation process, and on the other hand the model resulted in a major incentive for the suppliers to deliver as many registered users as possible, as quickly as possible.

- *Core values* had a significant influence on the initiation of the eIDM system and the initial division of roles between involved parties.
- *Circular 15/2007* from the Office of the Prime Minister impacted the dynamics of the subsystem in the sense that service providers became obliged to cooperate. *Liability issues* affected the divisions of eIDM responsibilities because the government decided to shift certification and registration responsibilities from private to public authorities.
- So far, there is no sound evidence suggesting that *changes in socio-economic conditions and technology* affected the dynamics of the subsystem. Moreover, the flexible model chosen allowed the integration of new technologies.
- Changes in *public opinion* did not significantly affect the dynamics of the subsystem. However, the MITTS scandal shows that public opinion can have a significant influence on government policy.
- The change of *systemic governing coalitions* affected the dynamics of the subsystem in the sense that the balance of power between players changed, and some actors were in a better position to impact the innovation. In addition, one of the changes in the systemic governing coalitions increased the threshold for citizens to obtain an eID.
- The *IT minister's push* and *European aspirations* affected the dynamics of the subsystem.

8.3 SOCIAL CAPITAL VARIABLES

This section draws conclusions for each of the social capital variables regarding the influence the social capital characteristics have had on the dynamics of the subsystem and subsequently on the joint, technological innovation process. Each sub-section concludes with an assessment of the influence of the specific variable on the innovation process, outcome and/or impact.

8.3.1 Openness versus group closure

Interviews indicate that the network in particular was closed in the development phase since the involvement of service providers was limited. One of the respondents: 'Only the Ministry of Social Policy was actively involved. And in later stages the municipalities too, but they were not actively involved in the development. […] We have learned the hard way that it would have been better to involve the service providers in the earlier stages of the innovation. When we wanted to implement the innovation, the service providers just said "we do not need it." Some of them had their own solutions. […] Today, we invite key stakeholders to MITA meetings.' Another respondent stated: 'Some of them [service providers] had their own solution. But Gatt is a very strong minister. In order to realise one eID, we had to kill the eIDs of Finance and other ministries. We just said: "We do not care how much you spent, the competing systems are finished." We did not want an enormously complicated situation. […] We made a list of policy issues and that went up to the minister, who went to the prime minister and then it went back to the top officials in the ministries.' The limited take-up by service providers

was solved by publishing a circular (15/2007) from the Office of the Prime Minister stating directives on the 'Use of Electronic Identity Management Tools.' Circular 15/2007 puts the following directive forward: 'The eID shall be considered to be the exclusive and single means of electronic authentication and signing for all and any government services,' and it thus ensures that users of e-Government do not need a different authentication token for each service.

Although the local councils were involved in the implementation of the eID innovation, several respondents stated that the cooperation was highly discordant. One of them: 'Yes, the municipalities were involved because initially they should have been the registration offices. There were many problems with the municipalities. To be honest, we bulldozed people around to get things done. But it did not work out. […] In my opinion it was also a political issue. The Labour Party councils did not want to cooperate. Often they said that the camera was not working or that the system was down. […] Eventually we decided to centralise the procedures.' Another respondent: 'Local councils were involved in some phases. But due to problems with photo making and how to solve these problems, I had to escalate it in the same way [as the reluctance of ministries to adopt the eID system]. I went to Claudio and he discussed it with the minister. […] I explained why we could not continue with the local councils: we needed rigour in the progress for the next stage of certificates. We needed a secure environment. They could not be given the responsibility. […] We just said [to the local councils], tomorrow you will no longer exist [as an RA].'

In addition, various interview reports indicate that coalitions were built within the e-Government policy team of MIIIT. One of the involved persons, for instance, stated the following: 'Before we held a meeting, we used to go for a cup of coffee to discuss the important topics. We had to work around the project manager, because he went to his superior at the drop of a pin. The cooperation with the suppliers and MITTS was closer than with the MIIIT project manager. The cooperation with the suppliers and MITTS focused on solving problems, and things could escalate quite quickly with the project manager.' The consortium parties also functioned as a strong coalition. One of the consultants reported: 'For us, the strong cooperation [within the consortium] was very important. The government changed its goals, processes and rules all the time, so we really needed to stick together and defend our interests. We trusted each other to such an extent that we could speak on behalf of the consortium, without harming the interests of the other.' And another consultant: 'We already knew each other quite well. We all went to volleyball camp in Libya when we were university buddies. The synergy between the [consortium] partners was very good. They [Fenlex] were a young law firm and forward looking, which suited our approach.'

Some have argued that the political polarisation in Malta may affect innovation processes in the sense that when the opposition comes to power, the employees and structure of the administration will also change, which affects all kinds of (and thus also innovation) projects. One of the respondents, for instance, explained: 'I was afraid of losing my job after the elections of 2008, but the Nationalist Party

remained in power. […] When the political colour of the cabinet changes after elections, so does the political colour of top administrators and policy makers. In Malta, the polarisation between parties is significant. […] There are various examples of structural changes [of the public administration] after elections. CIMU [Central Information Management Unit] was a very large organisation, but in 1996, after the elections, the socialists gained power and changed the structure.' And: 'This division between groups [Nationalists and Labour] can also be found in the social classes and geographic structure of Malta. People with a lower income, living in the south, tend to be socialists.' Interviews reveal that group closure plays a role in the sense that those social and political groups are quite separated, tend not to integrate with each other or to reach consensus.

In conclusion, group closure affected the joint innovation process in the sense that group closure mechanisms resulted in the limited involvement of actors outside the group and a limited willingness of these actors to join up in later phases. However, other factors, such as the regulatory framework (one of the parameters of the Advocacy Coalition Framework) obliged actors to become involved at later stages.

8.3.2 Strength of the ties

As Malta is a relatively small country, various respondents argued that the social network in Malta is quite powerful. One of them explains: 'In Malta, there is a strong social network, and if you look at the government as a social group, the reality is that you know everyone – probably about 90% of the group. Social interaction is so tight that it requires very strict government procurement to limit the risks of abusing of strong ties. Therefore, Malta needs an open procurement process. […] On the other hand, this hampers the innovation process in the sense that you cannot easily choose the supplier you want, the way private organisations can.' Another respondent stated about the tight Maltese network: 'Malta is very small. People know the minister by his first name. I am family of the prime minister, and this really is a disadvantage. People are afraid that you will use your ties. I am not invited for meetings; they withhold information from me. […] There are accusations all the time. Currently, there is an issue going on about the prime minister accepting an invitation to attend a football match in England.'

In several cases, strong ties have been used to solve conflicts, for instance regarding the financing of the Accerta consortium. The agreement between the Accerta consortium and the Maltese government was that the consortium would be paid 2 euros for every eID registration of a citizen. With a total population of around 400,000, the Accerta consortium stood to gain no more than 800,000 euros. However, due to several problems, citizen take-up lagged behind expectations, which also affected the Accerta consortium's financial pay-off. One of the respondents: 'We were really fed up with the situation. We did not get paid for years. […] At a certain point, Tonio [who was a Fenlex partner back then] walked out of the room. There was a financial conflict between Tonio and Claudio. […] Our CEO [Datatrak, Joe Fenech Conti] and Claudio have a very strong relationship. Datatrak already

had carried out projects for him, for instance the development of the Local Enforcement System. He talked to Claudio to settle things. […] Strong relationships are important; if we have a problem, we go to Joe and he talks to Grech or Gatt.' Another person involved: 'Joe is a friend of Claudio's. This helps. But still, we were in a government and a political environment. We depended on government; it was not an equal relationship.' Another respondent: 'Tonio Fenech's [CEO Fenlex] father was a minister, and he did not get along very well with Gatt and Grech. Therefore, Tonio could not talk informally with Gatt and Grech. Tonio was not invited to high-level meetings, whereas Joe was.'

Interviews reveal that strong or medium ties were not intensively used to involve service providers. A respondent explained: 'We did not use ties so much to involve local councils. Moreover, we did not have good ties in the Labour council districts. We just decided to involve them and approach them.' Ties did not play an important role in participation either when it came to other service providers. One of the interviewees stated: 'We did not really have many ties with other service providers. Of course, on the political level there were ties, but not on the policy level. In addition, we focused on what we thought was important and not on what everybody else thought. […] An exception may have been the Ministry for Social Policy. At a political level, Gatt and Gonzi collaborated well and made an agreement [that the Ministry for Social Policy would use the eID developed by MIIIT]. […] Together, they [both ministers] launched the eID system and the social security services in 2003.' The great majority of service providers, however, were not involved in the development phase. A more important factor regarding the joining up of service providers was the circular 15/2007 from the Office of the Prime Minister, which contained the following directive: 'The e-ID shall be considered to be the exclusive and single means of electronic authentication and signing for all and any government services.'

Strong hierarchical ties have been used to escalate issues. The top official responsible for e-Government had a strong relationship with the minister responsible for IT. One of the interviewees explained: 'There were several instances when we had to escalate; but only if it was really of interest. At a certain point in time, the service providers started to resist joining up. We made a list of policy issues and that went all the way up to the minister, the prime minister and back to the top ministerial officials.' And: 'Local councils were involved in some phases. But due to problems with photo making and how to solve these problems, I had to escalate it in the same way [as the reluctance of ministries to adopt the eID system]. I went to Claudio and he discussed it with the minister. […] I explained why we could not continue with the local councils: we needed rigour in the progress for the next stage of certificates. We needed a secure environment. They could not be given the responsibility. […] We just said [to the local councils], tomorrow you will no longer exist.'

Respondents stated that they used existing strong and medium ties to gain strategic information. One of the interviewees explained: 'I have been working for the government for over 16 years and know people from all kinds of ministries. This

is a huge advantage. They know me and my work and respect me. I have a lot of experience and therefore am more able to convince people. In addition, I know the people, their positions, their attitudes and their agendas. I am able to connect people, to match interests.'

To summarize, both weak and strong interpersonal ties affected the joint innovation process in the sense that these ties were used to solve conflicts and access and gain strategic information.

8.3.3 Heterogeneity of the network

Several respondents explained that whereas people of the same party tend to cooperate, which yields a certain degree of homogeneity, this did not affect the eID innovation since both the Nationalists and the Labour Party agree on the importance of information technology. One of them, for instance, stated: 'In Malta, there is a clear cross-party agreement that IT is not a controversial subject and that it does not get lost in political discussions. IT is important for the country.' Furthermore, a top official responsible for e-Government policy explained that he deliberately tried to create a team with like-minded people: 'What is very important for accelerating the innovation is to have time with the right people. To do this job [develop and implement eID system], I tried to establish a group of young, competent and ambitious people. Young people often want to prove that their capabilities are an asset for the organisation. They have an intrinsic drive. It is all about having the right team to conduct the work. That is the key driver.' And: 'Unfortunately, as a public officer, you can't always pick the people you want to.' However, there are no strong indications that the characteristics of the e-Government team involved in the Maltese eID innovation affected the innovation process.

In conclusion, there is no sound evidence suggesting that the homogeneity of the group involved in the idea and development phase of the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.

8.3.4 Broker's position

It seems that the top official responsible for e-Government, Mr. Grech, served as a broker between the administration and politicians, since he had a very strong tie with the responsible minister, Gatt, and his team of policy makers. He used this broker position predominantly to access and influence the policies of other ministries. However, there are not many other examples of actors who had and used their broker's role to influence eID innovation. More significant in the Maltese case is the position of parties totally new to the subsystem. One of the project managers, for instance, explained: 'I just applied for the job [as project manager], and when I was chosen and started attending the meetings, I hardly knew anyone. They knew each other very well. And I did not know anything about encryption modules, not to mention the hardware. For me the key was to learn fast and to establish ties as soon as possible. It was a very tough environment. […] And then the

idea came up to hire expertise to counterbalance the knowledge of the suppliers. It was difficult, the specialisation was very rare. Through our ties with specialists in Belgium, we got in contact with Irish consultants. This specialist community is global and very small. They [the Irish consultants] were my guardian angels, because I was new in the field. They helped to strengthen my position.'

Several interviewees also reveal the impact a change of positions can have on the innovation process. For instance: 'During the early stages of implementation, the chairman of MITTS, David Spiteri Gingell, took interest in the project. We reported to him and we started to use his ties, because he was very well connected with the government. He [Spiteri Gingell] was also the guy who had drafted the e-signature legislation. I started to use MITTS as a powerhouse and said that we were going to be the Certification Authority anyway. We opened a new company, MECS, Malta Electronic Certification Services, with David. He was a very inspiring leader. He left MITTS just before the project reached its final phase. This was quite a blow; we had to start all over when the new CEO came in.' Another respondent had the following to say about the change of positions: 'When we came back to the local councils [some time after the government had taken over the RA], it would have helped if people's positions had changed, thereby normalising relationships. But in most cases, the same people were still there.' Apparently, the changing of positions affects the continuity of the innovation, on the one hand, whereas on the other hand it can also create new opportunities for collaboration.

Some of the respondents identified a conflict of interest, when a public official is involved in both government and private industry. Someone explained: 'The chairman of MITA was also CEO of the private sector initiative Smart City. One week ago, he had to resign. In my opinion, there was a conflict of interest because he represented demand and supply simultaneously.' Several newspapers have also mentioned a potential conflict of interest. Business Today reported:[382] 'The whole media fuss on Claudio Grech's resignation is perhaps also partly due to the fact that neither the economy of Malta, nor that of Dubai is very promising at this moment in time. But it is not necessarily the only reason. For a long time prior to the launch of Smart City Malta, Grech was Austin Gatt's right-hand man. He was also the chief government negotiator for the entire Smart City deal. After being appointed by Tecom, not by government, as Smart City Malta's CEO, Grech was made chairman of MITA – government's IT agency. Even after Austin Gatt's reassurances about Grech's position not implying any conflict of interest, the former Smart City Malta CEO still remains very much associated with government.' Malta Today[383] wrote: 'This is not the first conflict of interest to hit Austin Gatt's ministry, where chairmen of government boards are often private entrepreneurs in their own right. Claudio Grech, the former right-hand man of Austin Gatt, is today the chairman of the Malta IT Agency (MITA). He has rebutted suggestions that his role as CEO of Smart City Malta could lead to a conflict of interest. Another is Joe Fenech Conti, the CEO of Datatrak Holdings. Datatrak provides the IT infrastruc-

382 http://www.businesstoday.com.mt/2009/10/07/editorial.html
383 http://www.maltatoday.com.mt/2009/06/28/t3.html

ture that processes speed camera pictures and gets a cut from the fines collected by speed cameras. But Fenech Conti is also the chairman of Roads Network Ltd, the government company that gives the green light for the installation of speed cameras.'

Finally some respondents referred to the fact that they use their strategic position as a gatekeeper of information. One of them stated: 'The fact that you are the linking pin between several persons or groups provides you with the power to control which information flows to which person. For instance, it can be in my interest for you not to know one of my relationships, and therefore I can decide not to bring you into contact with him. Conversely, I can also match the interest of several actors, the matching of which serves my own interest.'

To summarize, the changing positions of actors in the subsystem influenced the innovation process, and actors with a strategic position in the network were in a better position to influence the flow of information.

8.3.5 Interpersonal trust

Several respondents stated that the level of trust within the team working on the eID project was quite low. The lack of trust was mostly caused by uncertainty. One of the interviewees stated: 'We never knew what would be the next step in the project. […] As the government changed plans all the time, the uncertainty for us as suppliers was high and the trust was low.' And: 'The government changed its goals, processes and rules all the time, so we really needed to stick together and defend our interests. We trusted each other to such an extent that we could speak on behalf of the consortium, without harming the interests of the other. But the trust between us and the policy makers was low as their behaviour was rather unpredictable.' Lack of trust was also based on the fear for escalation. Someone explained: 'Before we held a meeting, we used to go for a cup of coffee to discuss the important topics. We had to work around the project manager, because he went to his superior at the drop of a pin. […] We did not trust him [the project manager] because we feared escalation.' And another interviewee: 'The project manager would lobby, but we lobbied too. We forwarded our proposals to Claudio and showed demos of how it should happen. This is how we were able to work around the situation [of lack of trust].'

The interviews reveal that in several instances the lack of trust can be compensated by hierarchy. One of the respondents explained: 'It is never healthy to damage the relationship with your superior, and therefore you cannot act in an opportunistic way. He or she is your superior and has the power to take reprisals for dishonest behaviour.' Written documents were also used to compensate for the lack of trust. Someone explained: 'Minutes were very important, because they functioned as an agreement between parties. The minutes made it clear what we would do and what we would not do. But there were many incidents. On several occasions, the minutes of the meeting were not sent to us, as promised. We know they were taken, but we did not get them, because it had to be copied to Claudio.

There were delays, problems, but we needed this documentation (minutes), to show it to Claudio. We were sending our minutes to Claudio regarding the problems we were facing and why we were lagging behind. […] Because we did not receive the minutes, our trust decreased.'

It appears that the level of trust in the Maltese eID case was also influenced by the presence of interdependencies. 'The fact that we [Datatrak and Fenlex] as suppliers had the same interest strengthened our relationship. We had great trust in each other, also because we knew that the other would defend his and thus our interest. We had to do the job together.' And someone stated the following on the relationship between suppliers and government: 'We had a good relationship with Claudio. We did a lot of contracts for the government. But you have to be careful: do not step on toes. The relationship is very much based on "yes we can do that", in other words based on dependency. We are not equal partners, we are subordinate. And in that sense you never know what they will do.' It seems that in the relationships where partners were equal and had a shared interest, the trust was greater than in the relationships were there was one dominant partner and interests were divergent.

In addition, the interviews reveal that trust is based on experience and reputation. One of the interviewees stated: 'I have been working for the government for over 16 years and know people from all kinds of ministries. This is a huge advantage. They know me and my work and respect me. […] People trust me because they have worked with me, know my work and know that I keep an appointment.' Another respondent explained: 'At a certain stage of the innovation, we did not trust the expertise of the suppliers anymore. The technical experts were no longer experts. They did not have the experience to do the job.'

The majority of respondents mentioned several ways in which they tried to build or maintain trust. One of the respondents, for instance, stated: 'Then again I had to build up trust, which was a gradual process. […] In the beginning I did not trust them too much, because when people were redefining their role they saw me as a threat. They started to trust me when they saw that I had project management skills, learned fast and did not break appointments. […] The fact that they [people involved] had some bad experiences with the previous project manager may have played a role. I really had to gain trust.' And someone else: 'The mechanism is simple: when Claudio moves, he takes people with him that he trusts. When he went to MITA, he took me with him because he trusted me and valued my loyalty.'

In conclusion, the lack of interpersonal trust affected the joint innovation process in the sense that actors were less willing to take risks and were more cautious, which slowed down the innovation process. Low levels of trust were compensated by hierarchy, contracts, interdependencies or aligned interests.

8.3.6 Conclusions

The characteristics and dynamics of the subsystem seem to have significantly influenced the joint technological innovation.

- *Group closure* affected the joint innovation process in the sense that it resulted in a limited involvement of actors outside the group and a limited willingness of these actors to join up in later phases. However, other factors, such as the regulatory framework, obliged actors to become involved in later stages.
- Both *weak and strong interpersonal ties* affected the joint innovation process in the sense that these ties were used to solve conflicts, access and gain strategic information.
- There is no sound evidence that the *homogeneity* of the group involved in the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.
- The *changing positions* of actors in the subsystem influenced the innovation process, and actors with a strategic position in the network were in a better position to influence information flows.
- The *lack of interpersonal trust* affected the joint innovation process in the sense that actors were less willing to take risks and were more cautious, which slowed down the innovation process. Low levels of trust were compensated by hierarchy, contracts, interdependencies or aligned interests.

8.4 OVERALL CONCLUSIONS

Regarding the parameters of the framework used for this research, the following aspects appear to have influenced the dynamics of the subsystem, the innovation outcome and/or impact:

- The lack of clarity on the *attributes of the solution* slowed down the development process, and the potential features of the system resulted in a limited willingness of users to adopt the system.
- On the one hand, conflicts regarding the *funding model* slowed down the innovation process, and on the other hand the model yielded a major incentive for the suppliers to deliver as many registered users as possible, as quickly as possible.
- *Core values* had a significant influence on the initiation of the eIDM and the initial division of roles between involved parties
- The *circular 15/2007* from the Office of the Prime Minister impacted the dynamics of the subsystem in the sense that service providers became obliged to cooperate. *Liability issues* affected the division of eIDM responsibilities since the government decided to shift certification and registration responsibilities from private to public authorities.
- So far, there is no sound evidence suggesting that *changes in socio-economic conditions and technology* affected the dynamics of the subsystem. Moreover, the flexible model chosen allowed the integration of new technologies.

- Changes in *public opinion* did not significantly affect the dynamics of the subsystem. However, the MITTS scandal shows that public opinion can have a significant influence on government policy.
- The change of *systemic governing coalitions* affected the dynamics of the subsystem in the sense that the balance of power between players changed, and some actors were in a better position to impact the innovation. In addition, one of the changes in the systemic governing coalitions increased the threshold for citizens to obtain an eID.
- The *IT minister's push* and *European aspirations* affected the dynamics of the subsystem.
- *Group closure* affected the joint innovation process in the sense that it resulted in the limited involvement of actors outside the group and a limited willingness of these actors to join up in later phases. However, other factors, such as the regulatory framework, obliged actors to become involved in later stages.
- Both *weak and strong interpersonal ties* affected the joint innovation process in the sense that these ties were used to solve conflicts, and access and gain strategic information.
- There is no sound evidence suggesting that the *homogeneity* of the group involved in the innovation process affected the characteristics of the innovation and subsequently the dissemination and take-up of the innovation.
- The *changing positions* of actors in the subsystem influenced the innovation process, and actors with a strategic position in the network were in a better position to influence the flow of information.
- The *lack of interpersonal trust* affected the joint innovation process in the sense that actors were less willing to take risks and were more cautious, which slowed down the innovation process. Low levels of trust were compensated by hierarchy, contracts, interdependencies or aligned interests.

9
Conclusions

In this ninth chapter, conclusions are drawn about the central research question: *How can an integrated model of the Advocacy Coalition Framework and social capital theory explain the occurrence of joined-up ICT innovations – in particular eIDM systems – in the public sector?* In the first section, a cross-case analysis is conducted of the empirical cases (Austria, Belgium, Finland and Malta), where the integrated model (as proposed in the theoretical chapter 2, section 2.7) was applied. The three sub-sections of this section respectively provide (a) a comparison of the impact of the Advocacy Coalition Framework variables in the four cases, (b) a comparison of the social capital theory variables in the four cases, and (c) an overall explanation of the occurrence of the innovation based upon the integrated model. The second section of this chapter tests the theoretical propositions as advanced in section 2.8 of chapter 2. Conclusions are drawn for each proposition to discover whether the empirical evidence points to an endorsement or rejection of the proposition. Section three outlines the limitations of the present research. Suggestions for changes to the model, with a view to increasing its explanatory value when applied at the meso level and to innovation processes are put forward in the fourth section of this chapter. Section five, describes future research challenges, and the chapter concludes with tangible policy recommendations in section six.

9.1 CROSS-CASE ANALYSIS

The aim of this paragraph is to provide an answer to the central research question: *How can an integrated model of the Advocacy Coalition Framework and social capital theory explain the occurrence of joined-up ICT innovations – in particular eIDM systems – in the public sector?* The answer to the question is explored by means of a cross-case comparison of the impact of each variable of the integrated framework (as proposed in the theoretical chapter of this thesis) in the first two parts of the section (Advocacy Coalition Framework parameters and events in 9.1.1 and social capital theory variables in 9.1.2, respectively). Based on this comparison, conclusions are drawn in the last part of this section (9.1.3) on the explanatory value of the model. The last sub-section draws conclusions about whether and how the model can clarify the innovation process, its outcome and impact, and thus provide an answer to the central question of the thesis.

9.1.1 Advocacy Coalition Framework parameters and events

Attributes of the good

The cross analysis of the case studies shows that in all cases evidence was found suggesting that the *basic attributes of the good* predominantly affected the *adoption (signing up and use) by citizens* and hence the *impact* of the innovation. In Austria, Belgium and Finland, the take-up and/or use of the eIDM solution by citizens is rather low. Only 1.5% of the Austrian population had obtained a Bürgerkarte certificate by November 2009. Research carried out by Indigov showed that in 2010 the use of the Belgium eID system was still very limited, with only 1.8% of the reference group (employed citizens) having used the system for signing electronic forms and 3.3% for identification purposes. In Finland, around 5% had a FINEID card by December 2009 – a card enabling citizens to obtain electronic services. In all cases, the limited take-up and/or use of the innovation was related to the features of the innovation. Interviews and user surveys reveal that in particular the application of smart-card technology created certain thresholds for citizen use, such as the installation of card readers and software. The Finnish VETUMA innovation is an illustrative example in this respect. The VETUMA service is a gateway that supports several eIDM applications, such as the TUPAS bank token, the FINEID card and a mobile identification system. The Finnish case shows that whereas the take-up and use of the FINEID card is low (around 5% of the population), the take-up and the use of the TUPAS bank token is high (around 80% of the population). While the TUPAS token is relatively simple to use, since it is based on a username and password/token combination, the (more secure) FINEID card requires the installation of a card reader and specific software. Subsequently, the impact of the TUPAS system has been much greater than the FINEID card in terms of transaction numbers and increased efficiency.

Two of the four cases (Belgium and Austria) indicate that the basic *attributes of the good* also impact the *adoption of the system by service providers* and thus the *impact of the innovation*. In Austria, several service providers stated that the complexity of the Bürgerkarte solution implies substantial efforts to implement the system and that this – combined with the low average number of yearly interactions between local government and citizens (1.2) – resulted in limited willingness to adopt the system. Service providers in Belgium are also reluctant to implement the solution because they find the system too complicated. Although municipalities are legally obliged to issue BELPIC cards, the use of the card for identification purposes is voluntary. A study by Indigov revealed that in 2008 only 30% of the municipalities offered electronic services through the BELPIC system. Service providers in Malta were also reluctant to use the eID system developed by the Ministry for Investment, Industry and Information Technology (MIIIT). However, here the central issue was not the complexity of the system, but the fact that they already had another system in place or preferred to develop their own system. This was a reason for the Prime Minister's Office to publish a circular (15/2007) and oblige (public sector) service providers to use the eIDM system as developed by MIIIT. Here, not the attributes, but the legal framework (another parameter of the framework) had the greatest impact on the adoption by service providers.

Furthermore, the cross analysis of the case studies reveals that *basic attributes of the good* impact *the type and number of parties involved* (and thus the composition of the subsystem). In two of the four cases (Austria and Finland), the choice for a certain concept implied the participation of specific players. At a certain point, the Austrian federal government chose to implement an open concept in the sense that the Bürgerkarte could be applied to any carrier (e.g. card or mobile phone). Due to this decision, there are up to ten card providers in Austria – as opposed to one – that have incorporated the Bürgerkarte function into their card (e.g. Social Security Agency, banks, universities, Austrian Computer Society). In Finland, the founding parties (four municipalities) deliberately chose to develop an eID gateway into which several eIDM systems can be integrated. Contrary to the solution chosen in other European member states, in Finland several eID applications can be used by citizens to obtain electronic services through the VETUMA gateway (e.g. FINEID card, TUPAS bank token, mobile identification). The consequence of this choice was that many eIDM providers were (and still are) involved in the innovation. However, both cases also demonstrate that although these parties participate, their role and subsequent influence on the innovation may be limited (e.g. card provision or supplier of eIDM application).

Lastly, all cases have shown that the basic attributes of the good not only impact the subsystem and innovation output and impact, but that the *subsystem also significantly impacts the attributes of the good*. Although the features of the innovation in the cases were partly determined by legislation (e.g. European e-Signature directive), available technology (e.g. biometrics was still rather immature) and availability of resources (e.g. e-Government budgets), the preferences and the beliefs of the actors of the subsystem also greatly influenced the specific features of the innovation. The influence of the subsystem actors is perhaps most clear in the Austrian Bürgerkarte and the Belgian BEPLIC cases. In the Bürgerkarte case, the vision of a small group of experts from the Institute for Applied Information Processing and Communications at the Graz University of Technology had a large impact on the exact attributes of the innovation. The Chief Information Officer of the Austrian federal government was head of this institute and involved certain cryptographic experts who had a significant influence on the design of the Bürgerkarte. In Belgium, several respondents stated that in the design phase around five key persons were involved, who highly determined the specifications of the BELPIC. Legal and technical experts of the University of Leuven, together with top officials of the Crossroads Bank and the National Register Department defined the BELPIC's requirements. In conclusion, there is a direct relation between the visions and beliefs of the actors of the subsystem and the features of the innovation.

Basic distribution of resources

The cross-case analysis shows that in three of the four cases (Austria, Finland and Malta), the *funding of the innovation* yielded *recurrent negotiations* between parties, and in several instances put pressure on the subsystem. In Finland and Malta, the suppliers of the eIDM solution were paid (amongst others) for each transaction (that is, each time a citizen uses the system). In Austria, the supplier

of certificates was paid for each certificate issued. Since the take-up and use by citizens remained behind expectations in all these countries (and consequently the revenues for the suppliers as well), the suppliers felt the need to renegotiate the funding model. Several respondents reported on extra meetings which were planned and the discordant character of those meetings. In all three cases, the negotiations put pressure on the subsystem. In some cases there were escalations and the innovation process slowed down because parties first wanted to solve the financial disagreement. However, the negotiations did not affect the direction, output or impact of the innovation in any of the three cases. Moreover, although the transaction or certificate-based funding model was a major incentive for suppliers to achieve a high take-up and use by citizens, the suppliers were not able to substantially influence the adoption. Several suppliers organised road shows and public campaigns to convince service providers and citizens of the advantages, yet the take-up and use remained low.

In two of the four countries (Austria and Finland), the *cost for citizens to obtain the eIDM solution* were perceived to have impacted the *take-up by citizens* and subsequently the *impact of the innovation*. In Austria, Belgium and Finland, citizens have to pay for obtaining a certificate and/or smart card. In the early years of the Bürgerkarte launch, the costs for obtaining the card's function, certificate and accompanying devices were around 100 euros. The Finnish FINEID card costs 48 euros, excluding the card reader. In both cases, respondents stated that these costs were/are an important barrier for citizens to obtain the solution. Moreover, in Finland citizens can choose between several eIDM tokens, and the great majority of the population prefers the (cheaper and more user-friendly) TUPAS bank token. In Austria, the federal government decided to decrease the costs of the certificates to 15.60 euros and increase the costs of the e-Card by 10 euros.[384] Yet, although many Austrian citizens have an e-Card, the take-up of the Bürgerkarte certificate is still low. This is caused, according to the large majority of respondents, by the few services available online, the attributes of the system (citizens need to install a card reader and software) and the low frequency of interaction between citizens and government (around 1.2 average interactions on an annual basis). In Belgium, the costs of the BELPIC card are between 10 and 15 euros, depending on the municipality.[385] However, since the card is mandatory in Belgium, the costs did not play a role in the take-up of the card. Although there has been criticism in national newspapers of the costs and the card's period of validity, today almost all citizens have a BELPIC card.

In the Finnish case, *financial incentives* have positively influenced the *joining up of service providers* and consequently the *impact of the innovation*. Although each service provider in Finland is essentially responsible for paying its own joining fee (2,400 euros) and transaction costs, the Ministry of Finance announced in 2007 that they would pay these costs if service providers would join up before the end of the year. Interview reports reveal that for several service providers this was an

384 http://a-sign.at/default.asp?ch=1&lang=GE&node=702
385 http://eid.belgium.be/nl/FAQ/Over_de_eID/index.jsp

important incentive to accelerate their joining up. The central government duly noticed that this was an effective stimulus and consequently made the same announcements in 2008 and 2009. As a result, however, service providers' belief in the temporary character of this financial arrangement began to wane. Other cases – in particular Belgium and Austria – show that (perceived) substantial investments that have to be made by service providers to implement the system is one of the reasons that they are reluctant to join up. The joining up of service providers affects the impact of the innovation in the sense that the more service providers are implementing the systems, the more electronic services become available through the innovation and the more efficiency gains (the initial purpose of the innovation) can be achieved in service delivery.

Fundamental cultural values

In all countries, certain *core values* have been drivers for the *initiation of the innovation*. In both Malta and Finland, actors of the subsystem perceived the belonging to the e-Government front-runners (nationally and internationally) as an important reason to start as early as possible with e-Government projects, such as eIDM. In Belgium and Austria, values such as increased efficiency, the simplification of administrative processes and customer convenience contributed to the start of the eIDM projects. More specifically, in all countries certain beliefs and perceptions – such as the undesirability of government fragmentation, the need to overhaul inert bureaucratic processes and administrations not keeping pace with social developments – resulted in certain tangible problem definitions (citizens being sent from pillar to post), and eIDM systems were perceived to be one of the solutions. In addition, in all countries (the one more than the other), technology was perceived as a means to achieve certain goals, and hence the approach was highly instrumental and managerial. In all cases, there was a strong belief in the capacity of technology to modernise government.

In two of the four countries (Austria and Malta), the *values and beliefs* of the actors who initiated the innovation influenced the *involvement of parties*. The founding actors in the Austrian case were highly technology-oriented. The top official responsible for the Bürgerkarte innovation had a strong technical background, was head of and professor at the Institute for Applied Information Processing and Communications at the Graz University of Technology, and involved specific technical specialists in the development team. The technological sophistication of the solution was one of the most important requirements set by the founding actors, and consequently experts specialised in advanced eIDM technology were involved. In Malta, one of the core beliefs was the importance of public-private partnerships. The key actors involved in the Maltese eID believed that 'whatever can be left to the market should be left to the market'. Their strategy argued that e-Government (and thus also eIDM) will require the concerted efforts of the public and private sectors and that the government would be mainly concerned with ensuring the legal framework and institutional set-up required to create and promote the ideal e-Government environment. The highly valued cooperation between private and public parties was echoed in the eIDM project since registration and certification tasks were initially assigned to private parties (whereas in other European mem-

ber states these are mostly public tasks). After some problems with the registration and certification processes, the central government decided that these tasks should be taken over by government agencies.

Lastly, two of the four cases (Austria and Finland) provide strong evidence that *prevailing values and beliefs* of the subsystem shaped the *features of the innovation*. The Austrian case is perhaps the most obvious example because the group responsible for the development of the innovation rated technical sophistication highly. Several respondents stated that the technical team was trying to push technological frontiers and that they felt that they were pioneering. This technological orientation, together with a broadly shared concern for privacy infringements, shaped the requirements for the Bürgerkarte innovation. The white paper, for instance, stated that the application of certain technologies – in particular asymmetric cryptography, hash procedures and certification – can result in a highly secure application. The use of these technologies resulted in a rather complex system, which – in turn – led to a limited take-up by service providers and citizens (see also section on attributes of the good). In Finland, respondents rated factors such as usability and 'convenience for citizens' highly. This resulted, for instance, in the core requirement that citizens should be able to apply the eIDM system of their choice and that the VETUMA gateway should support several eIDM systems. This strategy lowered the threshold for citizens to obtain electronic services as they could make use of their bank authentication tools. The Finnish subsystem actors found it less important to develop a highly secure system, and hence the security level of the most widely used identification system – a combination of VETUMA and TUPAS – is low compared to other European member states.

Basic legal structure

The cross-case analysis shows that in three cases (Belgium, Malta and Finland) *legislation* had a direct impact on the *subsystem* and- more particularly on the involvement of actors (restrictions for actors to join up and obligation for actors to join up). In Belgium, the law of 19 July 1991[386] restricts the usage of the eIDM system by private sector parties, stating that private parties cannot access the National Register or use of the National Register number for internal information management.[387] Exceptions are made for private organisations that received a specific mandate by law or by virtue of the committee or the National Register Department. The impact of the law of 19 July 1991 is that it essentially prevents private sector service providers from joining up. In Malta, legislation had the opposite effect. Because public sector service providers were not willing to start using the eIDM system (as they had their own system or preferred to develop their own system), the Prime Minister's Office decided to publish a circular (15/2007) and oblige (public sector) service providers to use the eIDM system as developed by MIIIT. Thus, in Malta legislation stimulated take-up by service providers. In Finland, it was the procurement law that affected the subsystem in the sense that if an ICT system is to be used by several organisations, the law requires these organisations

386 http://www.juridat.be/cgi_loi/loi_N.pl?cn=1991071931
387 http://ec.europa.eu/idabc/servlets/Doc?id=32297

to jointly submit a call for tenders. Consequently, in the tendering phase, around 60 municipalities were included in the contract. However, most of them became more actively involved in later phases of the innovation (diffusion phase). Lastly, in Malta liability legislation was the decisive factor for the central government to shift responsibility of the certification and registration tasks from the private to the public sector. In conclusion, legislation can both stimulate and impede the joining up of actors.

In addition, the cross-case analysis demonstrates that in two of the four cases (Austria and Belgium), there were several instances in which *legislation* affected the *take-up of the innovation by service providers and/or citizens*. In Austria, the use of sector-specific numbers for citizen identification in government processes is laid down in an e-Government act.[388] The main reason for the use of sector-specific numbers is the protection of citizens' data. The Austrian e-Government Act states the following (paragraph 8): 'In data files of controllers in the public sector, the identification of natural persons within the framework of the citizen card scheme may be represented only in the form of a sector-specific personal identifier.' Based on this legislation, an identification procedure was developed that uses both a source PIN and sector-specific numbers that are encrypted. The majority of service providers interviewed stated that the use of this identification model implies substantial changes to back-office systems, and hence means substantial investments in relation to expected gains in efficiency, which in turn increases the reluctance of service providers to use the system. In Belgium, legislation has affected the take-up of the BELPIC card by Belgian citizens. The BELPIC card is mandatory in Belgium, and therefore almost all citizens have one. However, the use of online services and subsequent online identification is voluntary. Several studies have indicated that whereas there is a broad diffusion of the BELPIC card, its use for the obtaining of electronic services or signing of electronic forms is still very limited.

Thirdly, two of the four cases (Austria and Belgium) show that the *composition of the subsystem* – more specifically the positions of or connections between key actors in the network – affected the *drafting and enactment of legislation*. In Belgium, one of the initiators of the BELPIC project was also chair of the Privacy Commission. Several respondents stated that the fact that this initiator combined both positions made him very effective in drafting the legislation and convincing members of the Privacy Commission and parliamentarians to adopt the legal basis for the eIDM system. In the Austrian case, the key persons involved in the development of the eIDM system and the electronic signature and electronic government legislation knew each other very well. Several respondents stated that the fact that they had strong professional ties resulted in an effective and efficient drafting and enactment of the legislation. In addition, the fact that the CEO of the Austrian Data Protection Commission was very well connected inside the Federal Chancellery made it more likely that a consensus would be reached that struck a balance between data protection and electronic service delivery.

388 http://www.epractice.eu/files/media/media_928.pdf

Changes in socio-economic conditions and technology

In all four cases, neither the interviews nor government expenditure budgets suggest that one of the main *economic changes* during the innovation processes – namely the burst of the internet bubble in 2001 – affected the *innovation process*. In all cases, respondents stated that the burst of the internet bubble did not have an effect. In three cases, budgetary decisions regarding how much to spend on the development of the eIDM system had already been made or the development process was already in full swing, which made the innovation process – according to respondents – irreversible. In all countries, the e-Government budgets increased in 2000, 2001 and 2002. Furthermore, in all cases the respondents expect the current economic crisis to have an impact on the innovation process since budgets will be cut, and this could influence the diffusion or direction of the innovation. In Finland, several interviewees, for instance, expect the economic crisis and subsequent efficiency measures to result in the decision to integrate several competing systems (e.g. the KATSO and VETUMA systems). In Malta, where there is one system in place, but where the government intends to enhance the system with smart-card and biometric technology, respondents expect that ambitions will be moderated. However, since there is no sound evidence regarding these anticipated impacts, the research remains inconclusive on this point.

In one of the four cases (Belgium), *technological developments* were perceived to have an impact on the *decisions to use certain technologies*. In Belgium, the increased use of certain new technologies (e.g. USB ports) implied that alterations had to be made to the chosen technical construction. Several respondents explained that extra meetings had to be organised and solutions had to be found to integrate new technologies. However, a comparison between the Belgian and the Maltese cases shows that the impact of new technologies may depend on the openness of the chosen technological model. Whereas in Belgium the strict technological choices made in the early phases of the innovation resulted in the limited flexibility to incorporate new technology, the 'four-level' development approach in Malta provided more possibilities to flexibly anticipate new technological developments. Furthermore, although respondents in both Belgium and Austria stated that they expect the take-up to increase, now that certain technological devices (such as card readers) are more available and user-friendly, currently there are no indications of this increased take-up.

Changes in public opinion

There is no sound evidence in any of the cases that *public opinion* affected the *innovation process* of the eIDM system. Although several critical articles appeared in newspapers in all four countries, almost all respondents stated that – thus far - these articles did not have a substantial effect on the dynamics of the subsystem nor the innovation direction, outcome or impact. In Finland, for instance, various critical newspaper articles were published in 2008 based on a report by the National Audit Office. The report stated that the development of online identification and authentication for services to citizens had been inefficient due to the lack of central coordination and the presence of competition between several systems. The vast majority of respondents argued that there was not much discus-

sion about the report within the group of actors, that it did not change the direction of the innovation, and subsequently did not affect the output or impact of the innovation either. In Austria, there were several critical articles on the limited take-up of the Bürgerkarte and the student protest on an e-Voting project that made use of the Bürgerkarte solution. However, the large majority of respondents stated that this criticism did not have an impact. Public opinion did not have an impact on the subsystem, innovation output or impact in Malta or Belgium either.

However, it also has to be mentioned that these findings do not imply that public opinion – by definition – does not impact the dynamics of the subsystem, the innovation output or impact. In Malta, an example was found where public opinion (although it did not impact the eIDM innovation process) affected the *information strategy and policy* of the Malta Information Technology and Training Service (MITTS) Ltd. In 2008, several newspapers (e.g. The Malta Independent, Malta Today and L-orizzont) reported on what they called 'the MITTS scandal'; the theft of 20,000 email passwords on a government server at MITTS. Although Minister Gatt and the top official Mr. Grech first denied that the passwords had been stolen, news reports forced them eventually to admit the incident, and the Labour Party called for Minister Gatt's resignation. Although Minister Gatt did not resign, measures were taken to intensify security policies and practices at MITTS. It thus seems that – depending on the perceived gravity and degree of failure – politicians are held accountable and subsequently be forced to change policy. In addition, plans are currently being prepared in Finland to integrate the VETUMA and KATSO system based upon the report of the National Audit Office, and therefore one could conclude that public opinion has provided input to a new eIDM strategy.

Systemic governing coalitions

Only in one of the three cases (Malta) did *changes in the systemic governing coalitions* substantially change the structure of the subsystem and the *direction of the innovation*. In the other three cases, there were several personnel changes in teams involved in the development and/or implementation (Belgium and Austria) or changes in ownership of the innovation (Finland). However, these changes did not seem to affect the innovation output and/or impact. In Belgium, the large turnover of staff at both the National Register Department and Fedict did not significantly affect the dynamics of the subsystem, the division of responsibilities, innovation output or impact since the top official of the National Register Department was in firm control over the project and has retained his position from the onset of the innovation to the present. The same goes for Austria, where the Chief Information Officer has been in firm control throughout the project. Although at a certain point ownership (and thus also the decision power) shifted in Finland from the Information Society Programme to the valt-IT unit of the Ministry of Finance, and later on to the State Treasury, this shift did not have a major effect since the innovation was already in the diffusion phase and the key remaining task was to stimulate the diffusion and further fine-tune the innovation. However, in Malta several changes to systemic governing coalitions did have an effect in several ways. Firstly, in the initiation phase the shift of the responsibility for e-Government policy from the Prime Minister's Office to the Ministry for Investment,

Industry and Information Technology (MIIIT) decreased the competition between the two ministries and enabled the IT-minded Minister Gatt to further define the eIDM strategy. Secondly, in the development phase the shift of the certification and registration tasks from private to public sector agencies helped MIIIT regain control over the project. This, in turn, affected the innovation direction in the sense that it yielded a fully public sector-owned eIDM system.

Policy decisions and impacts from other subsystems

In three of the four cases, the *European subsystem* seems to have impacted the strategies of the actors involved and the *innovation outputs and impacts*. In Belgium and Austria, the European electronic signature directive, the European policy on eIDM systems and involvement of subsystem actors in the European arena affected the strategies chosen and subsequently the innovation output and impact. In both countries, the involvement of subsystem actors during the preparations of the electronic signature directive in the 1990s was the cause for addressing the need for an eIDM system at the national level. The electronic signature directive, which focuses heavily on the use of (qualified PKI) certificates, has been incorporated into the Austrian and Belgian eIDM strategies and subsequent eIDM solutions that use qualified certificates and smart card technologies. In Malta, it was not the electronic signature directive, but their joining the European Union in 2004 that was an incentive for e-Government innovations in general. Several respondents stated that they wanted to show other European member states that they were equally advanced in electronic government and that this led to many e-Government projects, including the eIDM project. In addition, in two of the four countries (Austria and Malta), European benchmarks have been perceived as an important stimulus to speed up the eIDM innovation process.

In one case (Belgium), the *political subsystem* has significantly influenced the *direction of the strategy, output and impact*. In the initiation phase of the BELPIC innovation, the idea was to integrate the SIS card of the Social Security with the BELPIC solution. The actors anticipated that this would reduce the administrative burden for citizens and simplify the social security and civil affairs administrative systems. However, when discussing this integration with politicians and identifying the legislative changes that would be needed, some key politicians opposed the integration because they thought privacy issues would harm public support. Consequently, it was decided that the BELPIC solution would not be integrated into the SIS card. Over the years, there have been recurrent discussions in the political, administrative and public arena on the integration of the BELPIC and SIS card. Recent policy documents of the federal government state that one of the most important goals in the coming years regarding the BELPIC will be its integration with the social security card, which should stimulate use of the BELPIC.

In three of the four cases, the impact of the *local subsystem* on the *innovation direction, output and/or impact* was low, and in one case (Finland) the innovation was – by contrast – initiated by the local subsystem. Although there have been several efforts in Austria, Belgium and Malta to strengthen the cooperation between federal and local government in e-Government projects, the participation

of local authorities in the eIDM innovations has been limited. In Austria, regions and municipalities only became involved in the diffusion phase and hence their influence on the design of the innovation has not been significant. In Belgium, municipalities were involved in the pilot phase of the innovation; however, their influence was negligible since the project was firmly steered by the National Register Department. Several interviews revealed that although pilot communities had substantial criticism aimed at the system, the National Register Department concluded the pilot phase with a positive evaluation and recommendation to start the nationwide roll-out based on an unaltered strategy and policy. In Malta, the local authorities were only involved for a short period of time since the initial idea was for them to become the registration offices. However, the federal government changed policy and centralised these tasks. In Finland, the influence of – in particular four – municipalities was substantial since they initiated the project, defined the requirements of the system, and managed the tendering and development process. However, this cannot be perceived as impact from 'other' subsystems as they were part of the involved subsystem.

9.1.2 Social capital variables

Group closure

In three of the four cases (Austria, Belgium and Malta), strong mechanisms of *group closure* were present in the initiation and development phases, which affected the *dynamics of the group, innovation strategies, outcome and impact*. In Belgium, the majority of respondents agreed that only a few stakeholders were involved in the initiation and development phases. As one of the respondents explained: 'Only five people were in involved in the development stage of the technical and legal specifications. The decision makers knew the experts very well and knew that their visions on the needed technology matched. This really accelerated the process.' In the development stage of the Bürgerkarte in Austria, the influence of the CIO and his Institute for Applied Information Processing and Communications at the Graz University of Technology was profound. The CIO established a technical team to develop the solution and involved several employees from his institute. Various respondents stated that as a result of the CIO and his team's dominance, the approach used for the Bürgerkarte was too technical, and insufficient attention was paid to the demand of service providers and citizens. In Malta, the Ministry for Investment, Industry and Information Technology (MIIIT) was very powerful in the initiation and development phases. Although several respondents stated that the MIIIT project team lacked expertise (and thus had limited power), they had firm control over the project since they had the ultimate decision power. In Finland, group closure mechanisms were less present. In the initiation and development phases, several municipalities and ministries were involved. However, here too, some municipalities stated that they did not feel equally represented in the initiation and development phases. However, compared to the other cases, the group of founders was open and heterogeneous. In all four cases, the involvement of (representatives of) citizens was very limited.

In three of the four cases (Austria, Belgium and Malta), respondents stated that because there were *only a few stakeholders involved* in the initiation and development, the *process was very efficient* since it was relatively easy to reach consensus on the requirements of the eIDM system. An interesting example is Belgium, where various participants stated that they only needed one or two workshops to define the requirements. Moreover, this case provides several clear examples of the reproduction of ideas. Members of the team that carried out the feasibility study of the technical and functional specifications, for instance, stated that they were under pressure to confirm the strategy chosen by the National Register Department. The confirmation of the chosen strategy enabled the National Register Department to convince the Cabinet of Ministers to adopt the system (and thus to progress with the innovation in the direction they desired). In other cases, respondents stated that the fact that people involved in the initiation and development phases had a shared frame of reference supported the reaching of agreements and hence the decision making process. In Austria, several interviewees, for instance, contended that the like-mindedness of employees of the ICT Strategy Unit created a general atmosphere of consensus on the goals, strategies and direction of the innovation, which eased decision making.

In the three cases where *group closure mechanisms* were found (Austria, Belgium and Malta), effects on the *innovation outcome and impact* were also found. In all three cases, the take-up of the innovation by service providers was limited, whereas in Finland (where more stakeholders were involved) many service providers joined up. In Austria only a few government organisations use the Bürgerkarte to provide their clients with online services. The large majority of respondents stated that at the local level the limited use of the system is caused by a lack of skills and insufficient knowledge of the system. In addition, service providers stated that the system does not meet their demand because it is perceived as being too complex for the few services that they can put online. Also the use of the Bürgerkarte by citizens is very limited. According to the majority of respondents and user surveys, this is due to the card's complexity, administrative burden and infrequent use. In Belgium, the municipalities are obliged to issue the BELPIC card, though they are not obliged to provide electronic services through the card. In 2010, only 30% of the municipalities used the BELPIC for online services. The majority of respondents agree that the system is too complex and the implementation costs too high in relation to the potential gains in efficiency. Similar to the Austrian case, in Belgium the use of the BELPIC for online services by citizens is very low. In Malta, the same patterns have been found. The involvement of service providers in the initiation and development phase has been very limited, as has the adoption of the system by service providers. However, here the government decided to oblige service providers to use the system for the provision of online services. It appears that, as in Finland, more service providers were involved, the system meets their demand better and therefore the adoption and subsequent impact of the system is much higher.

Strength of the ties

In all four cases, strong and medium ties have played an important role in the initiation and development phases, and ties appeared to be less relevant in the implementation and diffusion phases. More specifically, it appeared that strong and medium ties predominantly affected the *dynamics* of the system, i.e. the gaining of strategic information, the involvement of actors, the influencing of opinions, the formation of coalitions and the reaching of consensus. These dynamics, in turn, affected strategies, decisions, rules, resources and subsequently also the innovation outcome and impact.

In all cases, actors have used *strong and medium* ties to access *strategic information* in the initiation phase. The many examples show that the better connected actors are in a network (see also conclusions on broker's position below), the more access they have to strategic information and the more able they are to influence the direction of the innovation. In Finland, one of the interviewees, for instance, stated: 'The fact that I have such a large network within governments helps me to understand why parties do what they do. I know their motives, plans and strategies. It also helps me to choose my own strategy.' One of the respondents in the Maltese case, for instance, explained: 'I have been working for the government for over 16 years and know people from all kinds of ministries. This is a huge advantage. […] In addition, I know the people, their positions, their attitudes and their agendas. I am able to connect people, to match interests.' Several interviewees in Austria and Belgium also pointed out that they used strong and medium ties to acquire strategic information on interdependencies, interests, agendas and decision-making power.

In addition, the cross-case analysis demonstrates that *strong and medium ties* were used in all cases to *involve actors* in particular in the initiation and development phases of the innovation process. Ties were used to involve certain expertise (e.g. in Austria, Belgium and Malta), to involve card providers or eIDM providers (e.g. Austria and Finland) and to involve pilot municipalities (e.g. Belgium). The cross-case analysis demonstrates that ties were used predominantly in the initiation and development phases for the involvement of actors and that in the implementation and diffusion phases ties were less relevant. In all cases, respondents involved in the diffusion phase stated that for service providers whether or not to join is a purely rational decision. In this phase, the attributes of the innovation are a given, and service providers explicitly strike up the balance of the innovation's advantages and disadvantages, which forms the basis for the decision to adopt the system or not. It seems that actors more heavily rely on the opinion of peers in the initiation and development phase because in these stages the outcome and impact of the innovation are much more uncertain. In the diffusion phase there is much more evidence of the innovation's potential impact, which is predominantly used for strategic decision making.

In all cases several examples were found where *strong and medium ties* were used to *influence opinions* in the initiation and development phases. The CIO of Austria and his team members used strong and medium ties to influence the opinions

of members of the ICT Board in order to try to advance the Bürgerkarte innovation. The ICT Board had decision-making power over several aspects concerning the Bürgerkarte, and hence the CIO and his team tried to influence the decision-making process. The CEO of the Crossroads Bank in Belgium tried to influence the opinion of members of the Privacy Commission and politicians by using strong and medium ties. In Finland, actors of the mobile telecom industry tried to use their medium ties to influence the agenda of the Information Society Programme. In Malta, strong and medium ties were used by the minister responsible for the eIDM system to influence the opinion of other ministers on the eIDM innovation. However, these attempts to influence opinion did not always have an impact. In some instances the actor who wanted to influence an opinion succeeded and in other instances not. For example, a top official in Belgium deliberately used his strong ties to convince politicians to integrate the BELPIC with the SIS card. His efforts were in vain as some of the involved politicians feared privacy debates and therefore did not support the integration.

In three of the four cases (Belgium, Malta and Finland), *strong ties* were used to *form coalitions*. In Malta, suppliers used their ties to combine their interests. The same pattern was found in Belgium where suppliers regularly met to discuss strategies to protect their interests in their relation with the National Register Department of the Ministry of the Interior. Finland may be the most illustrative example, where four municipalities deliberately formed a coalition to develop and promote their eIDM solution. Several Finnish respondents stated that the decision of the four municipalities to join forces was deliberate in the sense that they wanted to have enough critical mass to make their solution the nationwide solution. One of the interviewees, for instance, explained in this respect: 'It was very important that Helsinki was on board [of the VETUMA innovation]. Because of their involvement we had a coalition that represented one fifth of the Finnish population. Central government could not say no to that. The central government did not have any choice, they had to come aboard.' Overall, it appears that in cases where the innovation has been centrally initiated and developed, the formation of a coalition was less relevant than in the Finnish case, where there was no substantial central control over the project.

All these cases contain examples of the use of *strong ties* to *reach consensus* on a subject. Although reaching consensus can be perceived as being akin to influencing opinions, there is a difference between the two in the sense that the process of consensus reaching is reciprocal. In both Austria and Belgium, strong ties were used to reach consensus on e-Government or related (e.g. privacy) legislation. In those cases, there was tension between protecting citizens' data, on the one hand, and the implementation of the eIDM innovation on the other hand. In Austria, the strong tie between the CIO and the chair of the Data Protection Committee enabled them to reach consensus on the way citizens are identified in identification processes (by using a source PIN in combination with sector-specific numbers). In Malta and Finland, reaching consensus did not concern legislation but (respectively) the funding and requirements of the innovation. In Malta, strong ties between a top official responsible for e-Government and the CEO of a supplier were

used to solve a conflict that arose about the funding of the development of the system. The cooperation between government practitioners and the supplier's employees was in a deadlock because they seriously disagreed on the funding of the project. Both organisations escalated the problem to management, and the strong tie between two top officials was used to solve the problem. In Finland, strong ties were used in the initiation phase to reach consensus on the requirements of the innovation. Several respondents stated that the strong relationships between involved parties enabled them to openly discuss the requirements of the innovation and to define a concept acceptable to all.

Heterogeneity of the network

In three of the four cases (Austria, Belgium and Malta), *limited heterogeneity of the network* resulted in innovations that did not optimally meet the demand of the service providers and citizens, and this resulted in a *limited adoption of the innovations by those actors*. Although the knowledge needed to technologically develop the innovations was available in all cases, information on the requirements of service providers and end users was lacking. As stated in the section on group closure, the development of the Bürgerkarte was heavily dominated by a small group of technical experts. In Belgium and Malta, top officials of one specific ministry had firm control over the project. Although social capital theory indicates that homogeneity may stimulate adoption in the sense that shared frames of references may enhance diffusion processes, this was not the case in these countries. The network that developed the innovations in Austria, Belgium and Malta was different from the network that was to adopt the innovations. In these cases, one central ministry had a dominant role in the development, whereas the innovations had to be diffused among other ministries, regions and municipalities. There is evidence that the frame of references of the initiating ministries were different from the frame of references of the other government institutes. For instance, whereas the Strategy Unit of the Federal Chancellery in Austria paid great attention to security and the use of new technologies, the regions and municipalities perceived this as needlessly complex.

Broker's position in the network

In all four cases, the actors with a *broker's position* in the network were able to influence the dynamics of the network in the sense that they could broker information and contacts between groups and hence also had a strong influence on the *innovation strategy, decisions, output and impact*. The most influential brokerage position was found in the Austrian case, where the CIO had a very central position within the network and mediated between the interests of several involved parties; for instance between his institute IAIK at the Graz University of Technology, A-SIT, the Federal Chancellery, the European Commission and some service providers, such as the Austrian Computer Society (where he chaired a working group) and the Social Security Agency (where he was advisor). The CIO acted as a bridge between the interests and information of separate networks and brought together people who were not connected yet. One of the actors explained about the position of the CIO: 'When you have so many influential positions at the same time, you have a lot of strategic information about the interest of the parties,

which strengthens your position even more. You are able to steer the innovation in a certain direction. […] At certain moments in time you are able to connect people from diverse organisations and their interests.' In addition, in the initiation phase of the BELPIC solution in Belgium, there was an actor who had a strong brokerage position as he was chair of the Privacy Commission, CEO of Fedict, CEO of the Crossroads Bank and lecturer at ICRIS. This actor used his broker's position to mediate between the interests of the Privacy Commission and the BELPIC innovation team. One of the respondents stated: 'He [top administrator] was not only the CEO of Fedict and the Crossroads Bank, but also the chairman of the Privacy Commission. He knew the views held by members of the Privacy Commission and could anticipate those views by addressing all the issues which he thought would be raised.'

In three of the four cases (Austria, Belgium and Malta), there is evidence of the limited influence on the *innovation process* of people who had *low connectivity* within the network. An example was the position of the CEO of A-Trust in the Austrian Bürgerkarte case. Because A-Trust's management changed several times during the project, and A-Trust was a private sector partner, they were only weakly connected to the other actors within the subsystem. They had less strategic information and hence less power to influence the direction of the innovation. The same mechanism was found in the Belgian BELPIC case, where the CEO of Fedict was replaced by a new CEO and where the project management also changed several times. Several interviewees stated that these changes decreased Fedict's influence for some time. One of the respondents, for instance, explained: 'I was totally new in the network and I became responsible for the eID project. That was quite a challenge. The people of the National Register Department acted like "why are you here?" The first meetings with the National Register Department were very difficult. I did not speak their language; I did not know the informal positions of all these people, and whether their opinions were important. It took some time for me to consolidate my position and gain influence.' In Finland, the chair of the Information Society Programme was relatively new in the network of municipalities who founded the VETUMA innovation. The Finnish case, however, also reveals that the limited 'social network power' of a less connected actor can be compensated by (for instance) budgetary power. Although the chair of the Information Society Programme was not very well connected within the network, she was able to influence the direction of the innovation because she had access to its funding.

Interpersonal trust

The cross-case analysis demonstrates that the *level of trust* in the network predominantly affected the *dynamics* of the network. In high-trust networks, the cooperation was perceived as being efficient, whereas in low-trust networks the limited interpersonal trust had to be compensated by control mechanisms, such as hierarchy and contracts. In addition, the cases reveal that the level of trust also more directly affected the *innovation strategy* in the sense that networks with a relatively high level of trust were more willing to take risks (e.g. apply more innovative approaches). Lastly, the cases reveal that the level of trust was in particular relevant in the initiation and development phases and was less significant in the

implementation and diffusion phases, since in these latter phases the precise outcome and impact of the innovation was less uncertain.

In three of the four cases (Austria, Finland and Malta), a *high level of trust* was seen to be related to an *efficient cooperation* between parties. In Austria, the level of trust within the ICT Strategy Unit was perceived as very high. According to several respondents, the high level of trust not only made a free flow of information possible – and thus an efficient consolidation of knowledge – but also yielded a limited need for formalisation and confirmation. One of the respondents, for instance, stated: 'Of course, we had a warming up phase, but interpersonal trust grew very fast. In any case, the best idea prevailed, it did not matter who had the idea. We exchanged all information without restrictions. Since all the information was circulating, we were easily able to combine knowledge, define requirements and develop the solution. […] In addition, the process was efficient as we did not need to confirm and formalise agreements.' In Finland, respondents also stated that the high level of trust between municipalities made the communication process efficient. One of the interviewees, for instance, stated: 'Because we had trust, we did not need to put everything on paper. Everybody knew that I worked in an informal way, not on paper. Some institutes expect you to have all agreements on paper, but we did not. For instance, the State Audit Office wanted everything on paper. It is their role to watch government organisations and thus to have a certain degree of distrust.' And: 'As we had a high level of trust, the communication was very direct, open and efficient. We did not need third trusted parties to mediate and did not have long-winded discussions. There were no hidden agendas. We just said what we thought and tried to find solutions.' In Malta, several respondents explained that the high-trust relationship between the suppliers enabled them to act on behalf of each other, which decreased the time partners needed to spend on meetings.

In three of the four cases (Austria, Belgium and Malta), the *lack of trust* was compensated by *hierarchy*. In Austria, there was a low-trust relationship between the CEO of A-Trust (the certificate provider) and the CIO. This lack of trust was compensated by the trust the CEO of A-Trust had in the CIO's superior. For example, he stated: 'I know the boss of Mr. Posch quite well. I do trust him [Mr. Posch's boss]. When I do not agree with Mr. Posch I can go to his boss and arrange things.' There were several examples in Malta where the superior trusted his subordinate since loyalty was guaranteed by the fact that the superior could take far-reaching measures if the subordinate acted in an unreliable way. One of the respondents, for instance, explained in this respect: 'It is never healthy to damage the relationship with your superior, and therefore you cannot act in an opportunistic way. He or she is your superior and will have the power to take reprisals for dishonest behaviour. So of course I acted in the interest of Claudio in the eID project.' A certain form of hierarchy can also exist between the supplier and his/her commissioner. In Belgium, the consultancy agency which carried out the feasibility study was highly dependent on the National Register Department and the Crossroads Bank. One of the respondents, for instance, stated: 'Of course, [the top officials] trusted us. We were highly dependent on them. If we would have acted in an opportunis-

tic way, we would not have been assigned any new projects. Both [top officials] were very important for us; they were high-level clients and our entrance into the e-Government market.'

In three of the four cases (Austria, Belgium and Malta), several examples were found of the compensation of *distrust* by *written agreements*. Whereas the development team of the Bürgerkarte in Austria had no need for minutes to confirm agreements, in the federal ICT Board minutes were crucial. As one of the interviewees stated: 'In the ICT Board, minutes were very important. The minutes were used as a kind of contract, a formal confirmation of the agreements reached. There were several instances where had to refer to the minutes.' In Belgium, two actors with a limited level of trust in each other tried to divide tasks by drawing up what they called a co-existence agreement. One of them explained: 'After a year of cooperation we made a formal co-existence agreement. We made a detailed description of the areas the Crossroads Bank would cover and the areas Fedict would cover. We did this to prevent a situation in which we would encroach on each other's territory. I, for instance, got the social security sector, while he [top official] got the economic sector. We distributed this agreement to every minister so that they could not play us off against each other. Now we have a very strong cooperation.' And in Malta, the minutes made during the meetings between the Ministry for Investment, Industry and Information Technology and the Information Society were perceived as crucial. One of the respondents, for instance, stated: 'Minutes were very important, because they worked as an agreement between parties. The minutes made it clear what we would do and what we would not do. But there were many incidents. Several times the minutes of the meeting were not sent to us as promised. We know they were taken, but we did not get them, because they had to be copied to Claudio. There were delays, problems, but we needed this documentation (minutes) in order to show it to Claudio. We were sending our minutes about the problems we faced to Claudio and why we were lagging behind. […] Because we did not receive the minutes, our trust decreased.'

In all cases, various respondents stated that a *high level of trust* in others made them more willing *to take risks*. In Austria, the stakeholders involved in the development of the Bürgerkarte felt that they were acting in a politically sensitive and high-risk environment because the technology they were developing was new and the Bürgerkarte was high on the political agenda. The CIO responsible for the Bürgerkarte fell directly under the Federal Chancellor, and the project was closely watched by top officials and politicians. Several respondents who were part of the development team stated that the high level of trust within their team was needed because of the risks of project failure. In Belgium, some pilot municipalities stated that there was a serious risk in the pilot phase of damage to the municipality's reputation if the project turned out to fail. However, the fact that top municipal officials had high-trust relationships with top officials of the National Register Department made them more willing to be involved as a pilot municipality. In Finland, high-trust relationships made parties willing to cooperate despite the fact that – even in the procurement phase – the funding model was not clear. All actors involved were strongly confident that the chair of the Information Soci-

ety Programme would secure the funding. In conclusion, the cases demonstrate that partners are more willing to take risks if interpersonal trust is high.

The cases also show that the *level of trust was less relevant in later stages of the innovation*. Most respondents of the cases involved in the diffusion stage – the phase in which the innovation is very mature and ready to be implemented nationwide – stated that their choice to join up was a very deliberate and rational one, and not based on interpersonal trust. In the diffusion phase of the cases, more evidence of the advantages and the disadvantages of the innovation were available for service providers, and thus the uncertainty was lower. One of the involved actors explained this as follows: 'At the onset of the innovation, the level of trust was important as there were more risks. The innovation could fail. The procurement phase was also quite risky because the complex regulations meant that we did not know if we were doing it by the book. There were several uncertainties. In the diffusion phase, on the other hand, there was a clear-cut solution, and for the participating parties it was just a question of whether it was interesting to join or not. Trust in persons was not that important, but trust in the solution was.' Someone else stated: 'Interpersonal trust did not play a role in our decision to adopt VETUMA. What was important for our decisions though is that we trusted the quality of the solution, that we thought it to be the best solution to provide online services to our clients. As the description of the functions of the system was very clear and also the service delivered by Fujitsu [e.g. training and toolkit], there were not many uncertainties or risks for us.' It seems that the importance of trust in persons shifts towards trust in the solution during the diffusion phase.

9.1.3 Overall conclusions based upon the framework

The central question of this thesis is: *How can an integrated model of the Advocacy Coalition Framework and social capital theory explain the occurrence of joined-up ICT innovations – in particular eIDM systems – in the public sector?* The previous sections provided a summary of the empirical findings regarding the impact of each of the separate variables of the integrated framework. In the following sections, the mutual influence of the elements of the model are discussed on a more abstract level. Each set of variables of the model (e.g. parameters, events, constraints and the policy subsystem), is reviewed to discover how these sets of aspects impacted each other. The following figure depicts the empirical evidence and mutual influence between sets of variables in the integrated framework (the figure is explained in more detail in the sections below):

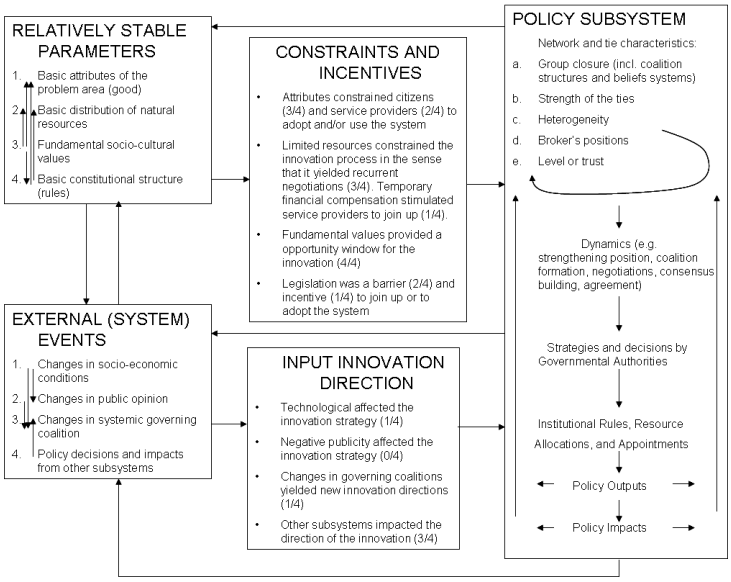


Figure 10. Empirical results depicted in the integrated model

Relatively stable parameters generating constraints and incentives

Overall, the cross-case analysis shows that the *parameters* (left upper box in figure 10 above) of the framework yield certain *constraints and incentives* for the eIDM innovation processes (central upper box). In three of the four cases (see also numbers between brackets in central upper box), the attributes of the eIDM solution provided thresholds for citizens and in two cases for service providers to join up. As the features of the solution in these cases did not meet the service providers' and citizens' demands, they were reluctant to adopt the innovation. The analysis of the distribution of resources demonstrates that in three of the four cases limited budgets and/or inadequate profit models led to recurrent negotiations and slowed down the innovation process. The negotiations, however, did not impact the innovation strategy, output or impact. In one case, temporary financial compensation provided an incentive for service providers to participate. All cases provide evidence that the prevailing values of the policy subsystem (e.g. increased efficiency) provided the innovation with a window of opportunity. In two cases, legislation was a barrier for stakeholders to join up, and in one case a circular was a stimulus (moreover, obligation) for stakeholders to get involved. In conclusion, the analysis shows that the parameters can generate both constraints and incentives and that these constraints and incentives affect the innovation process in the policy subsystem.

External (system) events influencing the innovation direction

In addition, the cross-case analysis reveals that *events* (left lower box) predominantly provide *input for the innovation direction* (central lower box). Although the evidence of the impact of events on the innovation process was less strong than the impact of the parameters (see case numbers between brackets in central lower box), in several instances events provided impulses for strategy change. In one of the cases, technological change affected the innovation strategy. New technologies (partly) overhauled the existing strategy as these new technologies were expected to be broadly used in the future and thus were incorporated into the strategy. In none of the cases public opinion significantly affected the eIDM innovation process. However, this does not imply that public opinion – by definition – does not have an impact. One case was found in which public opinion – although it did not influence the eID innovation – resulted in new government policy. In addition, in one of the cases, changes in the governing coalitions resulted in the innovation being steered in a new direction. These changes were in the initiation phase and were substantial because ownership changed. The direction of the innovation was still relatively open, so the new owner could largely determine the (new) direction of the innovation. Lastly, the impact of the European subsystem was present in three of the four cases. The policy, directives and/or membership of the European Commission significantly influenced the eIDM strategies in these cases. In two of these cases, a European Commission directive brought life to a national eIDM project, and in one case, a country's admission to the European Union acted as a boost for e-Government policy. Overall, the finding that events predominantly generate impulses for strategy change can be explained by the fact that new situations emerge that may change the perception of the advantages and disadvantages of the innovation. The parameters, by contrast, provide the contextual conditions for the innovation process.

Policy subsystem affecting parameters and events

The cross-case analysis also shows that the impacts are *less linear* than initially depicted in the model. In several cases, there is evidence that the parameters and events not only affect the subsystem, but that the subsystem actors also (more directly and not only through strategy, outcome and impact) affect the parameters and events (see central upper arrow and central arrow). In two cases, the subsystem actors had great influence on the basic attributes of the good because they were key to determining the specific features of the innovation. In other words, existing technological inventions and frameworks not only shaped the innovation strategies, output and impact, but the subsystem also affected the kind of technological inventions that were used and (further) developed. In addition, in two cases, the subsystem actors had a substantial and direct influence on existing legislation because they were heavily involved in the drafting of new legislation. Furthermore, there is evidence that the subsystem affected certain external events. In one case, for instance, public opinion did not only impact the strategy of the subsystem, but the actors of the subsystem also affected public opinion. Clear examples of spinning techniques were found, which were applied to positively influence public opinion. Lastly, in two cases, the subsystem had a significant impact on the eIDM policy of other subsystems, which – in turn – created new

opportunities for the subsystem. To summarize, it seems that the parameters and events not only affect the subsystem, but also vice versa, i.e. the subsystem affects the parameters and events. Thus the innovation process can be perceived as a process of mutual shaping rather than a linear process.

Separate parameters and events impacting each other

Another interesting finding revealed by the cross-case analysis is that the *separate parameters and events may mutually impact each other* (see arrows in left upper box and left lower box in figure 10 above). Here, too, the influence seems less linear and more dynamic. In two cases, there was strong evidence that the basic legal framework significantly affected the basic attributes of the good. In one case, the legislation required a certain level of security for data protection reasons. In addition, differences between fundamental values in several cases resulted in different legislation and requirements for the innovation. Whereas in Finland trust in government is relatively high and privacy generally not perceived as being threatened by government, in Austria trust in government is lower and privacy an important issue. These differences in fundamental values resulted in different kinds of legislation (the e-Government legislation of Austria focusing much more attention on data protection) and in the security level of the innovation (the Bürgerkarte being much more secure than the most widely used tool, TUPAS, in Finland). Values and legislation also seem to impact the budgets governments allocate for eIDM solutions. Contrary to Finland, in Austria and Belgium large budgets were allocated to the development of a highly secure tool. Furthermore, there were indications that changes in socio-economic conditions may result in changes in public opinion. Empirical data indicate that citizen trust in (certain) private institutions has declined as a consequence of the current economic crisis. This decline in trust may affect public perceptions of the division of tasks between private and public, for instance, with regard to the management of electronic identities. Thus, changes in socio-economic conditions may result in the change of public opinion, which – in turn –may yield changes in systemic governing coalitions. In conclusion, the separate parameters and events may impact each other.

Policy subsystem characteristics affecting subsystem dynamics

The cross-case analysis also shows that in all cases *the network and tie characteristics* predominantly affected the *dynamics* of the subsystem (right box in figure 10 above, upper arrow down). Although network dynamics are not explicitly mentioned in the original Advocacy Coalition Framework, the cases clearly show that some dynamics are strongly related to specific network and tie characteristics. For instance, in closed groups less interaction was needed to build a shared frame of reference for the innovation. In addition, existing strong and medium ties were predominantly used to shape group dynamics, e.g. to acquire strategic information, involve actors, influence opinions, form coalitions and reach consensus. It appeared that – depending on the risks, uncertainties and interests underlying the interaction – stronger or weaker ties were used. For instance, weak ties were used more often to acquire strategic information than to form coalitions. Furthermore, heterogeneity predominantly generated a certain cognitive distance, which required the development of a mutual understanding and thus more interaction.

The cross-case analysis also demonstrates that brokers are more able to influence group dynamics because they can brokerage between information and contacts. The most powerful brokers were those who also had a strong hierarchical position. In addition, groups where power was more equally divided generated more examples of coalition building. Overall, the evidence indicates that the network and tie characteristics predominantly determine the dynamics of the network, which – in turn – may result in certain decisions, output and impact.

Subsystem characteristics reinforcing themselves
Evidence from the case studies also shows that the *network and tie characteristics* may affect the *composition of the network* (curved arrow in the right box). For instance, existing ties, trust relationships and broker's positions were used to involve parties that suited the group of initiating actors, and group closure mechanisms and homogeneity resulted in the limited involvement of actors with diverging frames of reference and/or interests. Apparently, it was not uncommon for actors to involve other actors whom they already knew and whose interests were worth supporting. This involvement of actors with a shared frame of references and interests generated group closure mechanisms in the sense that the actors primarily reproduced the ideas of the group. In conclusion, it seems that any network involved in an innovation may strengthen its own characteristics and generate a certain degree of homogeneity and/or closure.

Subsystem dynamics resulting in innovation strategies, decisions, outputs and impacts
Finally, the cross-case analysis shows that group *dynamics* result in certain *strategies, decisions, appointments, outputs and/or impact* (arrows down in right box, figure 10). For instance, three of the four cases showed that group closure mechanisms led to a limited involvement of service providers and citizen representation, that little negotiation was needed to define the strategy and reach decisions regarding the requirements of the innovation since the frames of references and the interests of participating stakeholders were very much in line. However, these cases also show that the impact of the innovation was limited since it did not meet the demand of service providers, and citizens and their subsequent take-up and use was low. In one case, the network was more open to (other) service providers, which generated more consensus building and more interaction to define the strategy and to make decisions. In this case, the impact of the innovation was higher since more service providers and citizens adopted the innovation.

In conclusion, the integrated model of the Advocacy Coalition Framework and social capital theory as proposed in the theoretical chapter of this thesis (section 2.7), and the application of the model to four cases, shows that the variables of the model significantly contribute to the explanation of the occurrence, process, output and impact of the development of joint eIDM systems by separate government institutions. There is for all variables identified in the framework evidence of impact. Overall, it seems that the parameters and the network and tie characteristics have the most significant and direct impact on the innovation process, output and impact. The empirical test of the model also shows that the relations

between variables of the model are less linear than initially anticipated. The relation between variables appears to be more direct, constant and mutual, which makes the joint innovation process a *complex and dynamic system* of interrelated actors, conditions, incentives and events, and they, in turn, constantly influence each other. This insight into the interrelation of variables generates tentative suggestions for alterations to the model, which will be examined in section 9.3 of this chapter. However, the next section (9.2) first tests the validity of the theoretical propositions.

9.2 VALIDITY OF PROPOSITIONS

This section draws conclusions for each of the propositions regarding the rejection or confirmation of the proposition.

Social capital theory can substantially enrich the Advocacy Coalition Framework in the sense that it reveals the effect of network characteristics and dynamics on the innovation process.

The cross-cases analysis of the case studies confirms this proposition because the analysis demonstrates that social capital variables provide better insight into the characteristics of the actors, their ties and the network than the original Advocacy Coalition Framework. The characteristics of the actors (e.g. expertise, position), their ties (strength, level of trust) and the networks (closure, heterogeneity, broker's positions) generate certain network dynamics (e.g. negotiations, coalition formation, consensus building, and agreement), which affect the innovation strategy, decisions, output and impact. Social capital theory provides an operationalisation of the subsystem and hence makes social variables more explicit. It reveals that coalitions are most present in systems where power is equally divided and that coalitions are less fixed than perceived in the original Advocacy Coalition Framework. The latter point is in line with the findings of Kim et al. (2008) and Cairney (1997), who demonstrated that all kinds of coalitions can potentially emerge, including coalitions between actors who do not share deep-core beliefs. In addition, social capital theory unveils the dynamics of the network over time and the differences in relevance of the dynamics in the early stages of the innovation process when compared to the diffusion stages of the innovation. All cases point to the fact that in the initiation and development phases, social factors (e.g. ties, trust, broker's position) are more important than in latter phases, which largely endorses the research of Nesta et al. (2004), who found that the characteristics of the network vary in each innovation stage.

Moreover, social capital theory can help address some of the persistent criticisms against the original Advocacy Coalition Framework. One of the most dominant objections regarding the framework is that it fails to differentiate between more important and less important policy actors in a certain policy area because it does not distinguish between insiders and outsiders (e.g. Maloney, 1994). In addition, various scholars stated that the framework does not account for the possibility

that a policy domain may be structured by harmonious relationships among participants (e.g. Maloney, 1994; Kim, 2008). A third fundamental criticism is that the original framework considers the subsystem to be essentially stable over time, which does not do justice to the dynamics of the subsystem (e.g. Schlager, 1995). Because social capital theory, as applied in this thesis, identifies all actors related to the innovation (both within and outside the core group), reveals the (in)stability of the relationships (e.g. the strength of the ties and the level of trust) and investigates group dynamics over time (in several innovation phases), the primary criticism of the model can be addressed and countered.

Yet, testing the model empirically also reveals the need for a further conceptualisation and operationalisation of social capital variables and mechanisms. This finding supports the academic demand for advancing social capital theory (e.g. Franke, 2005; Kasaa, 2007; Dolfsma et al., 2009). Although the social capital variables identified in this thesis and integrated into the Advocacy Coalition Framework provide a basic overview of relevant network and tie characteristics, the cases show that other factors (e.g. decision-making power, interests, hierarchic and financial interdependencies) also play an important role. Several of these factors are explicitly addressed in traditional network theories (e.g. Pfeffer and Salancik, 1978; Kickert and Van Vught, 1984). It is a theoretical challenge to complete the typology of actor, tie and network characteristics and further explore the effects of these characteristics on the innovation dynamics.

Group closure encourages the reproduction of ideas and hence provides limited access to new ideas and strategies and limits the creation of innovations.

The empirical data reveal that it is not the limited access to new ideas and strategies, as suggested in literature (e.g. Teske et al., 1994; Uzzi, 1997; Newman et al., 2001; Hulsink, 2008), but the limited access to the demand of users (service providers and citizens) that hampered the innovation process. Whereas in social capital literature the emphasis is on the (re-)combination of cutting-edge knowledge (e.g. creation of revolutionary new technologies or radical scientific breakthroughs), in the four cases studied the adoption of the various systems by service providers and end-users was a central prerequisite for innovation impact. This latter finding supports the growing body of literature on user-driven innovation (e.g. Tuomi, 2002; Von Hippel, 2005) that emphasises the role of the end-user. It is also in line with the more generally perceived need for a more user-centred design of e-Government services. Many scientists claim that the creation and implementation of electronic public services is primarily guided by supply-side motivations and that technology rather than user needs are decisive in public sector innovations (e.g. Schedler and Summermatter, 2007; Kunstelj et al., 2007, Verdegem and Verleye, 2009).

In addition, a revolutionary new combination of knowledge was not needed in the cases studied. The eIDM technology had already been largely developed and applied in the private sector. Moreover, government practitioners had access to the most advanced eIDM experts and involved them in their network. The main

goal of the administrations was to customise technology and broadly implement it in the public sector. Consequently, it was not the access to totally new ideas, but the access to potential adopters that was critical in the innovation process. In three cases, the involvement of service providers and (representatives of) citizens was lacking, which resulted in a limited translation of their demand into the attributes of the innovation and subsequently a low take-up and usage. In these cases, there was evidence of a strong reproduction and consolidation of ideas by participating actors (e.g. see Bourdieu, 1983). These networks were selective in adopting new members and tried to bring together individuals who shared a certain frame of reference and set of interests, which eventually resulted in a limited innovation adoption and impact (which is in line with the reproduction mechanisms as described by e.g. Teske et al., 1994, Newman, 2001).

Group closure stimulates the diffusion of innovations that are highly compatible with the norms and values of the closed group.

In the four cases studied, there was no evidence that group closure mechanisms stimulated the innovation process in the diffusion phase, as one might expect from some of the literature (e.g. Van der Vliest, 2009). Several studies indicated there is more imitative behaviour in closed groups with strong belief systems – and thus innovations can diffuse quickly once some of the members adopt the innovation (e.g. Rogers, 1995; Van der Vliest, 2009). In the cases studied for this research, the potential adopters of the innovation did not belong to the closed subsystem that developed the system, however, and therefore this mechanism cannot be found. Yet, the cases did reveal that actors with a shared frame of reference were more able to reach agreements in the initiation and development phases. Respondents from several cases stated that their working in a small group with like-minded people eased the decision-making process, regarding the technical and functional specifications of the innovation (which is in line with e.g. Greve and Salaff 2001), for example. Moreover, in some cases only people with a shared frame of reference were involved in order not to disturb the development process.

Weak ties extend to a larger number of individuals and thus information on innovations can be spread among a larger number of people when passed through weak rather than strong ties.

This proposition cannot be endorsed by the cases studied, nor can cases confirm the line of reasoning of several social capital scientists (e.g. Granovetter, 1973; Gregerson and Johnson, 2001; Lundvall, 2006). All cases showed that in the diffusion phase ties were largely irrelevant. In all cases, the majority of service providers stated that the decision to adopt the system was a deliberate and rational choice based on information gathered from websites, conferences and road shows. The spreading of information occurred through the internet and official campaigns, rather than through ties. Based on the information gathered from websites and/or conferences, service providers and citizens weighed the pros and the cons of the innovation and decided whether to adopt it or not. Decisive factors for actors to adopt the system or not were the costs and the usability of the innovation.

However, it has to be said that the advantages and disadvantages of adopting the eIDM system were quite straightforward and clear to the potential adopters; in other words the uncertainty was relatively low. When the true impact of an innovation is less certain (e.g. the use of a new drug), people may rely more heavily on ties (which is contended by e.g. Hulsink et al., 2008).

Strong ties may stimulate the creation and adoption of highly uncertain innovations.

The four cases partially confirm this proposition. As stated in the previous section, ties were irrelevant in the diffusion phase (during which the innovation is adopted). However, the empirical evidence also shows that ties play a significant role in the initiation and development phases of the innovation. In all cases, strong, medium and weak ties significantly influenced the subsystem dynamics in the early phases of the innovation. Ties were used for several purposes, for instance to gain strategic information, involve actors, influence opinions, form coalitions and reach consensus. The strength of the tie used appears to have depended on the risks, uncertainties and interests underlying the interaction. For instance, weaker ties were used to acquire strategic information than for forming coalitions. This finding is in line with Lin (2001), who argues that the characteristics of the tie (e.g. strength of the tie) used by a person to access certain resources depends on the interests of that person. For instance, weak ties may be more relevant for finding a new job, whereas strong ties may be more useful for solving a precarious problem.

The empirical data also points to the neutrality of ties in the sense that ties were used both to stimulate and to impede the innovation, depending on the interest of the actor. This latter finding points to the endorsement of the argument in literature that social capital is a neutral concept and has to be approached technically rather than normatively (e.g. Lin, 2008). Several scientists have pointed to a 'negative' use of social capital (e.g. Schuller, 2000; Warren, 2008), cases in which high levels of trust and strong ties have generated interactions and behaviour that are generally perceived as being undesirable. Most scholars refer, in this respect, to the Mafia, sects, racist organisations or to the Timothy McVeigh case, for example, in which a United States army veteran used ties with bowling associates to prepare the Oklahoma City bombing (e.g. Schuller, 2000; Warren, 2001; Warren, 2008).

Heterogeneity of the subsystem enhances the innovative capacity of the subsystem.

As the innovation studied for this research did not require an unusual combination of creative ideas, this proposition cannot be endorsed. The development of eIDM solutions in the four cases studied did not require the involvement of a wide variety of expertises. Moreover, the knowledge needed to develop the solution was already quite well developed and mature. In the present cases, it was not the invention of new ideas but the application of (proven) ideas that was crucial. What was important for the innovation impact, however, was the involvement of the (heterogeneous) group of potential adopters. As stated in the section above on group closure, this heterogeneity was limited and therefore the impact of the

innovation was as well. The cases also show that the heterogeneity of potential adopters is primarily crucial in the initiation and development phases, because the attributes of the innovation are determined in these phases. In later stages of the innovation, heterogeneity was not a decisive factor for the innovation process. This finding is in line with Nesta et al. (2004), who argue that the characteristics of the network (e.g. heterogeneity) vary in each innovation stage.

Brokers have a significant influence on the direction innovation takes and can hamper or stimulate the innovation process.

The evidence from the cases confirms this proposition since all cases demonstrated the power position brokers have as they can broker between information and contacts, and – depending on their goals and interests – they can use their position to impede or support the innovation process. The findings are in line with Burt (1992), who stresses brokers' competitive advantage, and Hulsink et al. (2008), who state that brokers can act as bridges between persons and knowledge. Several cases showed that brokers combine strategic information and involve specific stakeholders to influence the innovation direction. The cases demonstrate that this variable is predominantly influential in the initiation and development process. In these phases, the direction of the innovation is still uncertain and the broker's position is used to influence the direction. The cases also indicated that more coalition building occurs in networks where there is not one central broker or person with hierarchical control. Several groups of stakeholders built coalitions around specific solutions, which subsequently competed with each other.

Trust supports high-risk innovation processes and can be partly compensated by interdependencies, control mechanisms and/or contractual arrangements.

The cross-case analysis unveils that the ambiguous character of the trust variable makes its impact versatile and difficult to grasp. However, the empirical data also show that the proposition is largely confirmed. Firstly, the empirical data demonstrate that the higher the uncertainty, risks and/or interests at stake, the higher level of interpersonal trust between actors is needed to jointly innovate. This confirms the premise of Nooteboom (2006) that collaborative innovation may require a certain level of trust because it implies substantial risks and uncertainties for involved actors (see also Chiles and McMackin, 1996). In addition, less interpersonal trust between actors seems to be needed in situations where the interests of the actors involved are essentially similar and/or they are strongly interdependent. Shared interests and/or interdependencies means partners will act in the interest of the other in light of their shared interest and/or because they may expect repercussions from the other. Furthermore, a lack of interpersonal trust can be compensated by hierarchy and/or contractual arrangements.[389] This finding is in line with Adler (2001), who described several structures where cooperation takes

389 Hierarchy can be perceived as a form of interdependency since a superior can take (far-reaching) measures in response to his subordinate's opportunistic behaviour. Contractual arrangements can be considered as legal interdependencies since opportunistic behaviour will have legal consequences.

place, namely market, hierarchy and/or trust constellations. Some cases demonstrated that innovation processes in a low-trust environment were less efficient than in a high-trust environment (the latter required less communication, consultation and formalisation), which confirms Adler (2001), who argues that trust has the unique capacity to enable the coordination of knowledge-intensive activities (such as innovation) within and between organisations.

In all cases, trust was particularly relevant in the initiation and the development phases and less relevant in the implementation and diffusion phases. As stated in previous sections, the uncertainty and mutual interdependency in the initiation and development phases are higher since the precise outcome and impact of the innovation process is largely unknown at that stage. In the implementation and the diffusion phases, the trust in the solution (based on a consideration of the pros and the cons) becomes more important. In the early stages, the level of trust predominantly affected the dynamics of the subsystem and the innovation strategies. In subsystems with a low level of trust, more confirmation and formalisation was needed, and overall the innovation process was perceived as slower than in networks with a high level of trust. In addition, networks with a high level of interpersonal trust were more willing to take a risky innovative approach than networks with a low level of interpersonal trust. These findings are consistent with Edelenbos and Klijn (2007), who compared several definitions of trust and found that vulnerability and risks were two of the three key foundations for the need for interpersonal trust.

Furthermore, some cases show that a distinction should be made between the strength of the tie and the level of interpersonal trust, and consequently the cases contradict scholars who identify trustworthiness as a precondition for social capital (e.g. Ahn and Ostrom, 2008). There were several instances in the cases where the strength of the tie was high – when actors saw each other on a daily basis, for example – but the level of trust low. In one case, a policy maker worked with a top official of a ministry on a daily basis, but the trust the policy maker had in the top official was limited. In addition, this example showed that the level of trust between two persons is variable since – vice versa - the superior trusted his subordinate because he knew that he would act in his interests. Overall, the combination of high trust and strong tie in the cases was more present than low trust and strong tie, possibly because people prefer to have a high-trust relationship with the people they intensively work with. In conclusion, contrary to what some scholars contend, a high level of trust is not – by definition – a characteristic of strong ties.

9.3 LIMITATIONS OF THE RESEARCH

There are several limitations to the current research. The most important limitations emanate from the qualitative approach of the research. Although the in-depth case study approach does more justice to the complexity and the immense variation of factors identified by the Advocacy Coalition Framework, it also implies

that only a limited number of innovation examples can be studied. The concrete mechanisms of social capital (and other) variables found in the present study cannot be generalised with regard to all public sector innovations. The cases studied concern the joint development and implementation of eIDM systems by (mostly) public sector parties, and hence the influence of variables can differ in other types of innovation or even in other cases of eIDM innovations, which fundamentally differ from the (most similar) cases as studied in this thesis. However, because of its explorative character the research yields the identification of new (mostly) social capital variables and causal effects. Moreover, the cases have contributed to the falsification of propositions that have a claim of universality (see, for instance, the finding on the proposition on the strength of weak ties). In conclusion, although the occurrence and relevance of variables has to be further tested in quantitative empirical tests, the qualitative insights of the present study provide the foundation for the direction of these tests.

Another limitation of the research may be the fact the cases studied have a time frame of a decade or more. A general criticism of studies that encompass a chronological examination of events in the – more distant – past is that interviews are less reliable since people are not able to accurately recall events that occurred ten (or more) years ago. However, in all cases studied many sources were examined, such as policy documents, newspapers, chamber documents, technical descriptions of the innovation, legislation, annual reports – which were used to confront and challenge statements by respondents. In other words, the studying of interview reports, documents and publications enabled triangulation and thus the endorsement of findings by multiple sources. In addition, a total number of 54 interviews were carried out, interview reports have been compared and only interview results found in several interviews have been used.

9.4 SUGGESTIONS FOR ALTERATIONS TO AND FUTURE APPLICATION OF THE MODEL

Several suggestions for changes to the model and its future application can be made based on the empirical findings. Firstly, the empirical test demonstrates that the model can be used to explain not only policy change, but also eIDM innovation processes in public sector environments. However, there are some crucial differences between innovation processes and policy change. As stated before, the most important difference is the locus of the change. Whereas policy is generally adopted by policy makers, top officials and politicians, the adopters of innovations are often government practitioners at the operational level, citizens and/or businesses. This difference in the locus of change has consequences for the scope of the study. For instance, if the subject of the study is the shift of traditional to sustainable policy programmes, the subsystem analysis may be limited to the policy level. However, when the subject of the study is the transition from paper-based to electronic patient records, for example, the so-called street-level bureaucracy, citizens and businesses should be involved as well. In other words, innovation processes not only capture policy making, but also the change

of practices, which implies that the scope of innovation studies is by definition broader than policy change. When applying the model to investigate innovation processes, the operational level should be taken into account as well.

Secondly, the cases have shown that the application of the model at the meso level provides valuable and tangible insights into the factors that influence innovation processes. The application at a meso level, however, also implies that the aspect 'long-term coalition opportunity structures', which Sabatier added to the Advocacy Coalition Framework in 2007, cannot be part of the model as it is a macro variable. Sabatier et al. have introduced this element to do justice to the diversity of democratic systems, such as the Westminster model in the United Kingdom and the more consensual system in the Netherlands. In a meso application of the model, however, researchers can take this variable into account by selecting cases with a variety of democratic systems. As a result, the diversity would not become apparent on a macro, but on a meso level. The present research has shown that differences in national democratic systems yield diverse compositions of the policy subsystem. For instance, in Westminster models, the composition appeared to be less heterogeneous than in consensual models. By selecting countries with both a Westminster model and a consensual model (as is done in this study), both mechanisms dominant in a majoritarian system (e.g. central steering) and a consensual system (coalition formation) will be captured by the study.

A third finding, which offers a lead for further development of the model is the fact that the model does not seem to capture one important variable. In two of the four cases, there were indications that the characteristics and skills of leading actors in the subsystem affected the dynamics of the subsystem and subsequently the innovation strategy, output and impact. In Malta, several respondents, for instance, stated that the leadership style of the minister responsible for e-Government – for example his skills to negotiate, convince and manage – contributed significantly to the speed and direction of the process. This finding seems to be in line with the large body of literature on leadership and (public sector) innovation, in which leadership is generally perceived as one of the explanatory variables for the occurrence of innovations (e.g. Borins, 1998, 2002). One way of incorporating this variable into the model would be to distinguish not only between networks and ties, but also between actor characteristics. One of the variables of the subsystem actors could be the characteristics and skills of actors who initiate and manage the innovation.

The last, and probably most important, finding that provides suggestions for changes to the model is the conclusion that the relationship between variables is surprisingly direct, constant and mutual when applied at the meso level. The empirical data shows that although in the initial model the subsystem affects parameters and events through innovation impacts, the subsystem directly impacts the parameters and events (and not only through innovations) more than anticipated. Subsystem actors, for instance, greatly influenced the attributes of the innovation, were involved in the drafting of new legislation and attempted to influence public opinion. The cases also show that the variables constantly affect each other, as op-

posed to their being a succession of events (influences of variables), as depicted by the arrows in the initial model. For instance, financial parameters influenced the dynamics of the subsystem during the whole process. Furthermore, the many empirical examples indicate that variables mutually influence each other. All cases point to a mutual influence between parameters, events and the subsystem. In conclusion, the relationship between variables is far more dynamic and chaotic than depicted in the model, and a major challenge for future research will be to further unravel the interrelations between variables.

9.5 RESEARCH CHALLENGES

The prior sections set the stage for the definition of future research challenges in this section. As the above perhaps made clear, both theoretical elaboration and empirical testing is needed to further advance the model. Four insights are needed to enhance the explanatory value of the model. The first is the assessment of whether all variables are captured by the model. Although the present study shows that a large majority of the factors that determine an innovation process, output and impact are captured by the model, there are indications that some factors may be missing. One of these factors is 'actor characteristics', as mentioned in the previous section. Secondly, although the first attempt to further conceptualise the policy subsystem has been made in the present study, a further operationalisation of the subsystem is needed. All social capital elements studied in this thesis have proven to have explanatory value. However, the study also reveals that some other factors – such as decision-making power, interests, hierarchy and interdependencies – may play a decisive role in innovation processes and need further theoretical elaboration. The third challenge is to gain more insight into the significance of the variables. The empirical data generated by the present study indicate that external events may be less influential than the parameters of the model. In addition, the network and tie characteristics seem to be most influential in the four cases studied. An improved understanding of the significance of variables may contribute to estimations of the feasibility of future innovation strategies. Fourthly, more insight into the interconnection between variables is needed. In other words, which factor affects other factors? The empirical data of the present study show that factors are highly interrelated; however, it does not identify all the causal relationships between variables.

A critical review of innovation theories can help identify the missing variables. The inclusion of 'leadership and innovation' theories, for example, can generate more insight into actors' behaviour and influence, and these insights can enrich the current model. Theories by Borins (1998, 2002), for example, can be applied to the model, translated into tangible variables and incorporated into the model. In addition, an examination of theories on the influence of actor positions, interests and interdependencies can help to further build the typology of network, tie and actor characteristics and hence operationalise the subsystem of the model. Qualitative empirical tests can be conducted to further the understanding of mechanisms underlying the social dynamics of the innovation process. The current study

has revealed many mechanisms (e.g. involvement of parties, coalition formation and consensus building), but there may be more mechanisms that this study fails to capture. Quantitative empirical tests can be used to reveal the significance of the variables and their interrelations. By studying one causal relation (e.g. the impact of public opinion on the change of innovation strategies) in a large number of cases, the correlation and the significance of the interrelation between the variables can be assessed. Lastly, since the model in this thesis has been applied to a very specific type of innovation, namely the joint development of eIDM systems by several (mostly) public sector actors, it has to be investigated whether the model needs adjustments when applied to other types of innovations. In conclusion, the key challenge for future research is to further improve the model by conducting both theoretical and empirical (qualitative and quantitative) research.

9.6 POLICY RECOMMENDATIONS

The initial impetus for studying the factors that determine the innovation process of eIDM systems in four countries was the more general and widely accepted assumption that Western governments face some important deficiencies in establishing joint-up innovations and that the cause of these problems has until now remained unclear. In the past decade, public sector innovation literature has been rather biased towards managerial and organisational explanations of these difficulties. This thesis widens the theoretical lens by incorporating social factors which may affect innovation processes. As this is a relatively new area, lessons may be found here with substantial added value for policy-makers. Consequently, this section focuses on how social capital can help achieve public sector innovations.

The cross-case analysis has shown that social capital variables, such as network and tie characteristics, significantly influence the innovation process, in particular the initiation and development of the innovation. Group closure, for instance, may yield limited involvement, the reproduction of ideas and a limited take-up of the innovation by service providers and citizens. In addition, brokers in the network seem to have greater influence on the innovation direction than others. The interview reports also reveal that these social capital characteristics are rather implicit, as is the decision to use social capital or not. Moreover, the large majority of interviewees stated that they had not deliberately considered the characteristics of the ties (e.g. level of trust, strength of the tie) and composition of the network (e.g. heterogeneity and broker's positions) and its effect on the innovation process. A more deliberate consideration of these social capital elements could, however, contribute to the efficiency of the innovation process, the innovation output and impact.

Insight into actor, tie and network characteristics enables policy makers to (together with other considerations, such as availability of resources) assess the feasibility of an innovation. The cases in the present research show that networks with certain characteristics (e.g. a low level of trust, one dominant party, limited heterogeneity) also demonstrate certain difficulties in the innovation process (e.g.

need for constant formalisation, limited incorporation of user demand). Before initiating an innovation, or joining an innovation, policy makers could consciously assess the social features of the network and subsequently estimate the extent to which it is likely that certain innovation goals will be achieved (and thus whether the innovation will pay off). Moreover, founding innovators can more deliberately compose the group of people involved in the initiation and development phase. Founders can ensure that the background of actors involved is heterogeneous enough to achieve the most interesting knowledge combination, that there are people involved with ties to other relevant subsystems (e.g. politicians), that they have access to information about the demand of service providers and end users. When there is limited trust, this can be addressed and measures can be taken, such as the intentional building of trust or (in the worst case) replacement of actors by others. In other words, a more deliberate consideration of social factors, and the question of whether they will stimulate or hamper the innovation process, can contribute to a better assessment of the public value that will be created and the desirability to invest in an innovation.

However, it is also important to point to the dark side of social capital here. Literature and the cases in the present research indicate that social capital – the set of social relationships through which resources are available – is neutral and can be employed for good or for worse. Although social capital can deliberately be used by policy makers to further innovation, interpersonal relationships can also be used to obstruct innovations. There are various examples in the relevant literature of actors using ties for illegal activities, such as fraud or corruption. Social capital is a neutral concept – like financial or cognitive capital – the positive or negative effect of which is determined by creating a balance between the values of the subsystem actors and values generally accepted within the society. This research presented examples of government practitioners who were passionately driven by the feeling that they had to contribute to society, and in other cases government practitioners found the speed of the process more important than complying with tendering procedures. Both used their ties to achieve their goals. The cases also show that there are several instruments and/or measures for ensuring that the actors' behaviour conforms to what society generally considers desirable. One of the most important measures may be the transparency of actions, strategies and decisions; by creating transparency, it would become easier to hold government officials and politicians accountable for behaviour that conflicts with the common good.

Summary

Over the past few decades, *joined-up or cooperative models* of government have become the dominant 'Leitbild' in public administration literature. Scholarly contributions repeatedly underline the generic premise that in today's complex society government institutions will only be able to achieve public value if they increasingly cooperate. According to many scholars, separate government agencies have to align existing practices. Moreover, they have to cooperatively innovate - to jointly design and create future services and concepts. Specific academic attention is paid to ICT innovations because ICTs are generally perceived to be essential for achieving better public services and increased democratic participation.

The scholarly devoted attention to joined-up ICT innovation is echoed in *government policies*. Strategic plans of several Western governments reveal a recurring demand for tangible cross-agency ICT projects. Almost all European member states, for instance, unveiled programmes to create *online one-stop shops* – digital points of access where citizens and businesses can obtain the services of several government agencies. Yet, evaluation studies also show that governments face *substantial problems* putting joined-up ICT innovations into place. Several barriers have been identified, such as the incompatibility of system architectures, diverging financial interests and fear of privacy infringements.

When taking stock of the literature that tries to explain the occurrence of joined-up ICT innovation, however, it seems that some *pieces of the complex puzzle* are missing. Despite the rich body of scholarly contributions, explanatory models are dispersed across disciplines. To achieve a more comprehensive understanding, an *overarching model* is needed that integrates factors from several scientific viewpoints. The *Advocacy Coalition Framework* provides this overview as its parameters cross-cut scientific disciplines. Although the framework was initially developed to explain 'policy change', a confrontation with innovation literature reveals a large overlap of factors indicating that the model can also be applied to 'innovation'.

Scholars who scrutinised the Advocacy Coalition Framework found that *the model has some limitations*. Over the years, the criticism predominantly concentrated on the framework's social subsystem. This social subsystem captures a set of the network's sociological characteristics (e.g. coalitions, policy beliefs and broker's role) that can affect the change process. Several researchers stated that the subsystem

characteristics are defined on an abstract (network) level and hence remain rather vague. *Social capital theory* can be used to further operationalise the subsystem because it unravels tangible social characteristics at the system, relational and individual level. For instance, it reveals the heterogeneity of the network, the strength of the ties between the persons involved and the positions and resources of persons in the network.

Three aforementioned ingredients are central in the present thesis: (a) difficulties in joined-up ICT innovations in the public sector (b) the use of the Advocacy Coalition Framework to explain those difficulties and (c) social capital theory to enhance the framework. Together, these elements lead to the central research question of this thesis: *How can an integrated model of the Advocacy Coalition Framework and social capital theory explain the occurrence of joined-up ICT innovations in the public sector?*

Since the concept of 'joined-up ICT innovations in the public sector' is too broad to be studied in one PhD project, the unit of analysis is confined to a specific ICT innovation, namely *electronic Identity Management (eIDM) systems*. An eIDM system is a means to electronically and officially prove one's identity in interactions with institutions. It enables end-users, for instance, to access secure databases, to sign electronic documents and to digitally obtain products. eIDM systems are the chosen subject of study because many governments perceive them to be *key enablers* for sophisticated communication with citizens and businesses. In addition, in most countries the development of an eIDM system is a joint effort of separate government entities as their aim is to cooperatively create *one system for all public services*.

In present thesis, an integrated model of the Advocacy Coalition Framework and social capital theory has been developed and applied to *four European cases* of joined-up eIDM innovations in the public sector, namely in Austria, Belgium, Finland and Malta. The empirical test yields several insights into *key barriers and drivers* for joined-up eIDM innovations. Firstly, in all cases, certain factors had significantly more impact than other factors. The features of the eIDM system and the beliefs and values of the actors involved, for instance, appeared in all cases to have more impact on the innovation process than socio-economic changes and public opinion.

Secondly, in all cases social capital variables significantly influenced the social dynamics of the subsystem and subsequently the innovation outcome and impact. For instance, group closure mechanisms resulted in a reproduction of ideas and hence a limited incorporation of the requirements of service providers and end-users into the eIDM design. In addition, actors with a broker position were in a far better position to influence the innovation direction than actors with a less strategic position. And, in all cases the actors were more willing to take risks – e.g. to apply a more innovative approach – in a high-trust environment.

The *empirical test of the integrated model* demonstrates that it is *eligible* to explain the occurrence of joined-up eIDM innovations. The model provides a broad overview of all kinds of contextual factors and detailed insight into social capital variables, their relevance and impact. However, the empirical evidence also yields some suggestions for alterations and future applications of the model. Because it was applied on a meso (sectoral) level, variables were more interrelated than in the original Advocacy Coalition Framework, which is generally applied on a macro level. In addition, the empirical test shows that a further operationalisation of the social subsystem is needed since the precise impact of some characteristics (e.g. interests, hierarchy and interdependencies) remained rather unclear.

Policy recommendations predominantly concern the awareness of the social environment in which an innovation takes place. Policy makers can more deliberately explore the social features of the network and change social settings in order to increase the public value of an innovation. However it should be emphasised that social capital – like other forms of capital, such as financial resources – is neutral; it can be used for good or for worse. As the cases show, social ties are used both by people dedicated to achieving improved services and people who are primarily driven to maintain their position. One of the most important measures to ensure that social capital is used in a way that fits social values is transparency. By creating transparency of actions, strategies and decisions, it would become easier to hold government officials and politicians accountable for behaviour that conflicts with common interests.

Overall, one can conclude that the integrated model as proposed in the present thesis provides a sound starting point for the development of a more generic model to explain joined-up ICT innovation in the public sector.

Nederlandse samenvatting

De afgelopen decennia zijn *geïntegreerde of coöperatieve overheidsmodellen* het dominante "Leitbild" geworden in de bestuurskundige literatuur. Wetenschappelijke bijdragen benadrukken herhaaldelijk dat in de complexe samenleving van vandaag overheidsinstituties alleen publieke waarde kunnen genereren als zij samenwerken. Volgens veel wetenschappers moeten overheidsinstellingen de uitvoering van hun taken aan elkaar aanpassen. Sterker nog, zij moeten gezamenlijk innoveren – samen toekomstige diensten en concepten ontwerpen en creëren. Specifieke academische aandacht richt zich op *ICT innovaties* omdat ICTs over het algemeen worden beschouwd als essentieel voor het bereiken van betere publieke diensten en toegenomen democratische participatie.

De wetenschappelijke aandacht voor gezamenlijke ICT innovaties klinkt door in het *overheidsbeleid*. Strategische plannen van verschillende westerse overheden laten een terugkomende vraag voor concrete en organisatieoverstijgende ICT projecten zien. Bijna alle Europese lidstaten hebben bijvoorbeeld programma's gelanceerd om online *"centrale overheidsloketten"* te creëren – digitale contactpunten waar burgers en bedrijven diensten van verschillende overheidsinstanties kunnen afnemen. Echter, uit evaluatiestudies wordt duidelijk dat overheden *substantiële problemen* ondervinden bij het gezamenlijk realiseren van ICT innovaties. Verschillende barrières zijn benoemd, zoals het niet op elkaar aansluiten van systeemarchitecturen, afwijkende financiële belangen en vrees voor inbreuk op de persoonlijke levenssfeer.

Wanneer de literatuur over gezamenlijke ICT innovaties wordt overzien, blijkt echter dat enkele *stukjes van de complexe puzzel missen*. Hoewel er een rijke hoeveelheid aan wetenschappelijke bijdragen is, zijn verklarende modellen sterk versnipperd tussen de disciplines. Om een diepgaander inzicht te krijgen is een overkoepelend model nodig dat factoren van verschillende wetenschappelijke perspectieven integreert. Het Advocacy Coalition Framewerk biedt dit overzicht omdat de parameters verschillende wetenschappelijke disciplines doorkruisen. Hoewel het Advocacy Coalition Framework in eerste instantie was ontwikkeld om beleidsverandering te verklaren, laat een confrontatie van het model met innovatie literatuur een grote overlap van factoren zien. Dit wijst erop dat het model ook kan worden gebruikt om innovatie te verklaren.

Wetenschappers die het Advocacy Coalition Framework bestudeerd hebben, vonden *enkele beperkingen van het model*. In de loop der jaren concentreerde de kritiek zich vooral op het sociale subsysteem van het raamwerk. Dit sociale subsysteem bevat een set van sociologische kenmerken van het netwerk dat betrokken is bij de innovatie (e.g. coalities, beleidsovertuigingen en intermediaire rollen) en die het veranderingsproces kunnen beïnvloeden. Verschillende onderzoekers stellen dat de karakteristieken van het subsysteem op een abstract (netwerk) niveau gedefinieerd zijn en daardoor vaag blijven. Omdat *sociaal kapitaal theorie* specifieke sociale kenmerken ontrafelt op het systeem, relationele en individuele niveau kan het worden gebruikt om het subsysteem verder te operationaliseren. Het geeft bijvoorbeeld inzicht in de heterogeniteit van het netwerk, de sterkte van de relaties tussen betrokken personen en de posities en bronnen van personen in het netwerk.

Drie bovengenoemde ingrediënten staan centraal in deze dissertatie: (a) problemen met gezamenlijke ICT innovaties in de publieke sector, (b) het gebruik van het Advocacy Coalition Framework om deze moeilijkheden te verklaren en (c) sociaal kapitaal theorie om het raamwerk te versterken. Samen leiden deze elementen tot de centrale onderzoeksvraag van deze dissertatie: *Hoe kan een geïntegreerd model van het Advocacy Coalition Framework en sociaal kapitaal theorie gezamenlijke ICT innovaties in de publieke sector verklaren?*

Omdat het concept 'gezamenlijke ICT innovaties in de publieke sector' te breed is om te bestuderen in één promotieproject, is de analyse eenheid afgebakend tot een specifieke ICT innovatie, namelijk *elektronische identiteitsmanagement (eIDM) systemen*. Een eIDM systeem is een instrument om – in interacties met instituties - iemands identiteit elektronisch en officieel te bewijzen. Het systeem maakt het voor gebruikers bijvoorbeeld mogelijk om toegang te krijgen tot beveiligde databases, om elektronische documenten te ondertekenen en om digitale producten te verkrijgen. eIDM systemen zijn gekozen in dit proefschrift omdat veel overheden deze systemen als *belangrijke randvoorwaarde* beschouwen voor geavanceerde communicatie met burgers en bedrijven. Daarnaast is de ontwikkeling van een eIDM systeem in de meeste landen een gezamenlijk initiatief van verschillende overheidsinstanties omdat zij één systeem voor alle publieke diensten willen creëren.

In deze dissertatie is een geïntegreerd model van het Advocacy Coalition Framework en sociaal kapitaal theorie ontwikkeld en toegepast op vier Europese cases van gezamenlijke eIDM innovaties in de publieke sector, namelijk: België, Finland, Malta en Oostenrijk. De empirische test genereerde verschillende inzichten in belangrijke barrières en stimuli voor gezamenlijk eIDM innovaties. Ten eerste hadden bepaalde factoren in alle cases substantieel meer impact dan andere factoren. De kenmerken van het eIDM systeem en de overtuiging en waarden van de betrokken actoren hadden bijvoorbeeld in alle cases meer impact op het innovatie proces dan sociaaleconomische veranderingen en de publieke opinie.

In de tweede plaats hadden sociaal kapitaal variabelen in alle cases een grote invloed op de sociale dynamiek in het subsysteem en vervolgens ook op het resultaat en de impact van de innovatie. De geslotenheid van groepen resulteerde bijvoorbeeld in een reproductie van ideeën en daardoor ook een beperkte verwerking van de eisen van dienstenverleners en eindgebruikers in het eIDM ontwerp. Daarnaast hadden actoren met een intermediaire rol tussen verschillende partijen aanmerkelijk meer invloed op het innovatie proces dan actoren met een minder strategische positie. En, in alle cases waren betrokken actoren meer bereid om risico's te nemen – bijvoorbeeld door een innovatiever concept toe te passen – in een omgeving waar het inter-persoonlijk vertrouwen hoog was.

De *empirische test van het geïntegreerde model* laat zien dat het *geschikt* is om gezamenlijke eIDM innovaties te verklaren. Het model biedt een breed overzicht van allerlei contextuele factoren en een gedetailleerd inzicht in sociaal kapitaal variabelen, hun relevantie en impact. Daarnaast vloeien er uit het empirisch bewijs ook verschillende suggesties voort voor verandering en toekomstig gebruik van het model. Omdat het op een meso (sectoraal) niveau is toegepast, zijn de variabelen bijvoorbeeld onderling sterker gerelateerd dan in het originele Advocacy Coalition Framework – dat meestal op een macro niveau wordt toegepast. Daarnaast laat de empirische test zien dat een verdergaande operationalisatie van het sociale subsysteem nodig is omdat de precieze impact van sommige kenmerken (bijvoorbeeld belangen, hiërarchie en afhankelijkheden) onduidelijk blijft.

Beleidsaanbevelingen betreffen vooral bewustwording van de sociale omgeving waarin een innovatie plaatsvindt. Beleidsmakers kunnen de sociale kenmerken van het netwerk doelbewust verkennen en sociale constellaties veranderen om de publieke waarde van een innovatie te verhogen. Het is echter belangrijk om te benadrukken dat sociaal kapitaal – zoals andere kapitalen als financiële middelen – neutraal is; het kan ten goede en ten kwade worden ingezet. Zoals de cases laten zien, worden sociale relaties zowel door personen gebruikt die toegewijd werken aan een verbetering van diensten als door personen die vooral gedreven worden door het behoud van hun positie. Eén van de belangrijkste instrumenten om er voor te zorgen dat sociaal kapitaal wordt gebruikt op een manier die strookt met maatschappelijke waarden, is transparantie. Door transparantie van acties, strategieën en besluiten te creëren kunnen overheidsfunctionarissen en politici makkelijker verantwoordelijk worden gehouden voor gedrag dat in strijd is met het publieke belang.

Concluderend kan men stellen dat het geïntegreerde model zoals gepresenteerd in deze thesis een gedegen startpunt biedt voor de ontwikkeling van een algemener model om gezamenlijk ICT innovaties in de publieke sector te verklaren.

Curriculum vitae

Noor Huijboom has worked as a senior scientist at TNO since September 2005. Her main area of work concerns networked (ICT) innovations in the public sector and the influence of social computing on public sector services. From 2002 to 2005, she worked as a senior researcher at Zenc – a research and advisory organisation – and published the book Belgen doen het beter (publisher: Meulenhoff/Manteau). Before joining Zenc, she had a position as (senior) consultant at Ernst & Young Consulting (1998-2002). Huijboom has a master's degree in public administration from the Tilburg University and studied international and European law at the University of Angers, France. She has conducted several national and international studies on e-Government. For instance, in 2006 she carried out a study on the future of e-Government for the Institute for Prospective Technological Studies (IPTS), a joint research centre of the European Commission. In 2007, she participated in a research project for the European Commission on e-Government progress in Europe, which revealed e-Government best practices in European member states and charted the progress being made towards the implementation of the i2010 e-Government Action Plan. Huijboom was project leader of the research project 'The impact of social computing on public sector services' commissioned by IPTS in 2008, and in 2009 she worked on the Action Plan Progress Study for the European Commission. Huijboom has published numerous scholarly studies, as well as opinion articles in leading national newspapers (e.g. de Volkskrant, NRC Handelsblad and NRC Next).

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Appendices

Interview format
Categorisation strengths of ties and levels of trust
List of persons interviewed

INTERVIEW FORMAT

INTRO

- Professional background
- Role and in which innovation stage involved

PART 1 – TIE ASSESSMENT

- Organisations involved in each stage
- Persons involved in each stage
- For each person identified (use of template with categories) in each innovation stage:
  - Strength of the tie
  - Level of trust

PART 2 – QUESTIONS INTERVIEW

Innovation process

- Key decisions in innovation phases (initiation, development implementation and diffusion)
- Key strategies in innovation phases
- Important agreements reached between parties in innovation phases
- Innovation output (e.g. evidence features of the system, take-up by service providers, take-up by citizens/businesses, actual use, number of transactions)
- Innovation impact (e.g. evidence of administrative burden reaction, user satisfaction)

Stable parameters

- Attributes of the eIDM system (e.g. security level, technology used)
- Distribution of resources (e.g. budgets needed to finance the development, implementation and diffusion)
- Fundamental values (e.g. what are the major advantages and/or disadvantages of the system)
- Legislation (e.g. data protection, e-Government act)
- Impact of parameters on subsystem

Events and disruptions

- Changes and disruptions (burst of the internet bubble, political interventions (radical policy change), critical incidents (hacking of government computers), European directives
- Changes in public opinion (e.g. public support or objections to the system)

- Changes in systemic governing coalitions (e.g. change of responsibilities, ownership of the system)
- Policy decisions and impacts from other systems (e.g. European Union)
- Impact of events and disruptions on subsystem

Subsystem

- Specific aims in each innovation stage
- Interests of parties involved (e.g. political interests, conflicting interests, interests at stake)
- Risks and difficulties (e.g. technological, legal difficulties)
- Interdependencies within network (e.g. dependencies on knowledge, decisions, cooperation)
- Resources needed and divided in innovation stages (e.g. knowledge, expertise, adoption by critical mass, funding)
- Relation between characteristics of the network (see sociogram) and dynamics in the subsystem (decisions, strategies, consensus reaching, appointments)

SUGGESTIONS FOR DOCUMENTS
SUGGESTIONS FOR OTHER PERSONS TO BE INTERVIEWED

CATEGORISATION STRENGTH OF TIES AND LEVELS OF TRUST

Degrees of strong – weak ties (emotional intensity/intimacy and amount of time spend together)

1. **Very strong tie**
– Intense private contact (family, friends) **and/or**
– Very frequent and intensive professional contact (every week, very intensive collaboration)

2. **Strong tie**
– Being informed about the personal situation of the other **and**
– Frequent professional contact (once every two-three weeks) **and possibly**
– Occasional private contact

3. **Medium**
– Professional contact (once a month/two months) **or**
– Former intensive relationship (former strong tie)

4. **Weak tie**
– A few times met
– Possibility of calling each other

Levels of trust

1. **Very high**
– Strong belief that the other will act in an honest way
– High level of reciprocity
– Strong mutual interdependencies (financial, knowledge, reputation)
– Confidence-building, sound reputation

2. **High**
– Belief that the other will act in an honest way
– Reciprocity (favour for favour)
– Mutual interdependencies (financial, knowledge reputation)
– Good reputation, **and possibly**
– Transferable trust

3. **Medium**
– Belief that the other will act in an honest way
– One-sided interdependency
– No particular reputation as regards trustworthiness

4. **Low**
1. Not assured of the honesty of the other (could be opportunistic)
2. Behaviour of the other difficult to predict
3. (Possibly: opportunistic reputation)

LIST OF PERSONS INTERVIEWED

Austria

- Head of E-Government Innovation Centre, Graz
- Project manager at the E-Government Innovation Centre, Graz
- Federal Chief Information Officer of the Austrian Government
- Former head of the technical unit of the ICT Strategy Unit of the Federal Chancellery
- Former technical specialist of the ICT Strategy Unit of the Federal Chancellery
- Former public relations officer of the ICT Strategy Unit of the Federal Chancellery
- Chairwoman of the Austrian Data Protection Commission
- Head of the e-Government Department of the Federal Chancellery
- Former project leader of Bürgerkarte implementation at University of Vienna
- Manager at the Austrian Computer Society
- Manager at the Austrian Social Security Agency
- Head of the Centre for e-Government of the Danube University Krems
- Managing director of A-Trust

Belgium

- Manager of the Civil Affairs department of the municipality of Tongeren
- Researcher at the research group ESAT/Cosic at the Catholic University of Leuven
- System architect at Steria, Belgium
- Project manager of eID at Zetes, Belgium
- Senior consultant of the consultancy company CSC Computer Sciences
- Chairman of Fedict, the Federal ICT Public Service
- Policy-maker at the National Register Department
- Coordinator of the National Register Department's eID regional office
- Administrator General of the Crossroads Bank for the Social Security
- Former programme manager of eID at FEDICT
- Manager of the Civil Affairs department of the municipality of Leuven
- Former technical specialist of eID at FEDICT
- Senior manager of Deloitte Enterprise Risk Services

Finland

- eID programme manager at the valt- IT unit of the Ministry of Finance
- Senior advisor at the Association of Finnish Local and Regional Authorities
- Former project manager of eID for the municipality of Espoo
- Project manager of eID at the State Treasury Department of the Ministry of Finance
- Project manager of eID of the municipality of Vantaa
- Project manager of eID of the municipality of Espoo

- CEO of the Finnish Federation for Communication and Teleinformatics
- IT advisor of the city of Helsinki
- Former programme director of the Information Society Programme of the Prime Minister's Office
- Former eID programme developer Fujitsu
- IT manager of the municipality of Lahti
- Former Secretary General at the Ministry of the Interior
- eID project manager of the National Board of Education
- Former sales director of Fujitsu

Malta

- Former project leader of eID at the Ministry for Investment, Industry and Information Technology
- Department manager of the Project Management Office, Malta Information Technology Agency
- Partner at Fenech & Fenech Advocates
- IT and Communications policy manager at the Ministry for Infrastructure, Transport and Communications
- Business Development Manager of LOQUS Group
- Director of Exigy
- Executive director of Exigy
- Director of the compliance unit of the Malta Financial Service Authority
- Senior desk officer of the Malta Financial Service Authority
- Deputy registrar of the Malta Financial Service Authority
- Chief Operations Officer at Datatrak
- Chairman of the Malta Information Technology Agency
- Former project leader of eID at the Malta Information Technology Agency
- Project leader of eID at the Malta Information Technology Agency