



The role of skills and competencies in enacted e-Government implementation: investigations of experiences in developing countries

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Abstract

The use of information and communication technology (ICT) can potentially increase the efficiency and effectiveness of government administrations. However, many barriers stand in the way of successful e-Government implementation. These include national level factors such as poor infrastructure, political stability, and lack of funds, as well as institutional and organisational barriers.

In addition, many research endeavours have identified the lack of skills and competencies of personnel as a barrier in the implementation of information systems in government. The need for these e-Government implementation skills permeates the entire organisation, encompassing general management competencies, technology management and technical skills, as well as general literacy in ICT (Leitner 2006; Schuppan 2010; Parrado 2005; Settles 2005). In developing countries in particular, capacity building for ICT adoption remains a formidable challenge.

The objective of this study is to explore the roles that skills and competencies play in the process of e-Government implementation in developing countries. By doing so, this study aims to lend insight into how skills and competencies can best be developed and retained to obtain better implementation outcomes.

A common approach to understanding the process of e-Government implementation in the literature is through stage models (Layne & Lee 2001; Ronaghan 2001). These are useful in providing benchmarks against which to measure the level of implementation. However, they do not account for why governments are at a particular stage of development, or provide insight into how to move from one stage to the next. The Technology Enactment Framework (Fountain 2001) provides an alternative approach by accounting for how institutional arrangements and organisation structures and processes influence implementation outcomes. In this thesis, the Technology Enactment Framework and its refinements are used as a basis for developing an *a priori* model which accounts for skilled actors. A supplementary model accounting for the sequence of activities in the process of e-Government implementation was also developed from literature on e-Government and institutional theory.

In addressing questions of how skills and competencies affect the process of technology enactment in developing countries and how they are developed and retained in this process, data from case studies in five developing countries is used. Informants included senior government officers responsible for policy making, project managers involved in implementation, and end-users and vendors of the technology. In addition to the 38 interviews,

documents on e-Government strategy, project documentation and consultant evaluations were also examined.

The data collected in the course of conducting the case studies, was first coded against constructs in the *a priori* model. Analysis was then performed in two phases. In the first phase, both top-down and bottom-up approaches were used to examine how skills and competencies might fit into the refined Technology Enactment Framework. In the second phase, a further analysis was made to examine how skilled actors influenced enacted e-Government implementation outcomes at various points in the process of implementation.

Findings from the cases demonstrate that actors' skills and competencies do impact e-Government implementation outcomes, and skilled actors are able to modify organisation structures and processes as part of the enactment process. Individual skills and competencies are also affected through the process of enactment, through the choice of technologies, the institutional arrangements, and the organisational structures and processes of the agency undergoing the change. This suggests that the Technology Enactment Framework can be enhanced to include a construct that explicitly accounts for skills and competencies.

In addition, e-Government implementation is enacted through a sequence of activities involving different stakeholders and actors over a period of time. Hence, different skills and competencies are required at different points throughout the implementation process. These skills and competencies allow actors to diagnose implementation issues, improvise new routines addressing these issues, and perform the new routines. They are also able to facilitate the process of sensemaking for the organisation. The Phase Model of Skills and Competencies for Enacting e-Government Implementation (PMSC eGI) developed in this thesis provides a framework for understanding the skills and competencies necessary at different points in time, and how they might influence enacted e-Government implementation outcomes.

In addition to the theoretical implications above, this study has practical implications for capacity building and e-Government policy in developing countries. The findings suggest that capacity building should first address the ability to develop an organisation specific case for technology adoption, and an in-depth understanding of the tasks involved in implementation. A large component of training should be "on-the-job". Strategies should be developed to ensure that skills are retained within the government, and can be transferred from one agency to another. Governance processes, particularly around procurement and information sharing should be established early to avoid waste, duplication and rework.

The thesis provides the basis for further research into the role of skills and competencies in the enactment of e-Government. Two broad directions for further research in this area are recommended. Firstly, longitudinal analyses of cases guided by the frameworks developed in the thesis to investigate how skills and competencies affect institutional arrangements which are likely to evolve more slowly can be conducted. Secondly the frameworks developed can be used to hypothesise relationships among the major constructs for quantitative approaches – which would then measure the relative impact of skills and competencies and other factors in e-Government implementation outcomes.

Keywords: e-Government, t-Government, transformation, skills, competencies, multiple case study, developing countries

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Chapter 1 Background and Introduction

1.1 Introduction

The rise of the internet and other of information and communication technologies (ICT) has provided opportunities to increase efficiency within the government, and to increase contact and delivery of services to citizens through electronic means. This has also had positive impact on economic growth (Vu 2011). Initiatives to use ICT by the government “for the provision of information and basic public services to the people” have been broadly grouped together as electronic government (e-Government) projects (UN 2004, p. 15).

In 2005, a United Nations study on e-Government Readiness suggested that such technology came with “the promise of leapfrogging traditional development cycles” (Bertucci 2005 , p. xi). In 2010, it is now seen as “revitalizing public administration, overhauling public management, fostering inclusive leadership and moving the civil service towards higher efficiency, transparency and accountability” (Qian 2010, p. 1) and key to human development.

By 2014, all 193 countries of the United Nations have websites. However, relatively few have developed a high number of transactional services (Qian & Aquaro 2014). The United Nations e-Government Survey 2014 finds that developed nations are further ahead in implementing e-Government, confirming an earlier study done by Arseneault (Arseneault 2005). This is, perhaps, not unexpected. While all countries face challenges in implementing e-Government, developing countries have to implement e-Government in a context of lower overall industrial and economic development. While the potential remains high, the challenges are also higher in developing countries.

Many reasons have been cited as barriers to e-Government implementation, from competing priorities, to the lack of technology infrastructure and components, social and cultural factors and insufficient human capacity (Gupta & Jana 2003; Chou, Chen & Pu 2008; Edmiston 2003; Mukabeta Maumbe, Owei & Alexander 2008). There are also challenges in moving from providing online information to actually providing systems that allow transactions to be fully completed online (Layne & Lee 2001; Ronaghan 2001; Qian & Aquaro 2014).

Beyond factors at national levels, the process by which technology is adopted and put to use at each institution plays a significant role. Fountain (Fountain 2001) suggests that the outcomes of technology implementation are greatly influenced by the behaviour of bureaucrats, organisational forms and institutional arrangements. Gil-Garcia extends Fountain’s analysis and

also links national level “environmental factors” to successful e-Government implementation at the institutional level (Gil-Garcia 2012).

The skills and competencies of the actors within the organisation have also been cited as a key factor in the effective implementation of e-Government (Leitner 2006; Parrado 2005; Hunnius & Schuppan 2013). Beyond the technical skills necessary to keep the technology operating, skills in organisational transformation, designing technology-enabled processes and the functional ability to use the technology to provide government services are also required. For an organisation starting out as largely paper-based, the need for new skills permeates the entire organisation.

While skills and competencies have been recognised as being important to e-Government implementation, there has been little analysis on how exactly they play a role in the process of technology adoption by governments. This is particularly important in developing countries because they are more likely to start out with largely or entirely paper-based public administration organisations. As a result, they face bigger challenges in skills and capacity building for e-Government implementation. This study examines the role of skills and competencies in the process of e-Government implementation in developing countries. How do skills and competencies affect the process of enacting e-Government in developing countries? And how are skills and competencies developed and retained in the process of enactment in developing countries?

1.2 Significance of the Study

The findings of the study conducted in this research will have practical implications for developing countries intending to adopt ICT within their government. In particular, the study highlights the key set of skills and competencies necessary for successful implementation, and where the skills might best reside within the government organisation. It also extends theory through the inclusion of skills and competencies within existing theoretical frameworks and demonstrates the relevance of different skills throughout the process of e-Government implementation in developing countries.

1.2.1 Managerial Implications for Developing Countries

By identifying the role of skills in e-Government implementation in developing countries, the study lends insight to the nature and sequence of investment in capacity building in specific skills development and retention. This is in contrast to implementation strategies

currently adopted by many developing countries which focus on software, hardware or infrastructure. It is envisaged that this will increase the likelihood of implementation success, decrease wastage and accelerate subsequent development, particularly in developing countries.

1.2.2 Advancing Theoretical Development

The study will extend the Technology Enactment Framework (Fountain 2001) by including the role of skills and competencies as an element in the analytical framework. The extended framework illustrates the role of skilled actors in the perception of problems encountered in the process of enactment, their performance and improvisation of novel routines, and their role in facilitating sensemaking for the organisation.

The thesis also proposes a model that presents a process of enacted e-Government implementation over time. This process view is also absent from the Technology Enactment Framework. Technology acquisition processes in developing countries tend to follow fairly predictable path – a period of preparation prior to appointing an ICT vendor, a period when the ICT vendor installs the technology, and a period after which when the technology is put to use. Different actors are involved at different time periods, and as a consequence, different skills and competencies also become important at different points in time. The importance of different skills at different points in time is illustrated in the model.

1.3 Structure of Thesis

The following chapter will review the literature, drawing on three streams of work. The first stream examines the e-Government imperative and its goals. The second looks at barriers to implementation, which exist at the level of the state, the level of the institution, and at the level of individual actors. The third stream looks at skills and competencies required for e-Government implementation.

Chapter 3 examines the literature for a suitable theoretical foundation, and develops an *a priori* theoretical model for the study. The model includes the inclusion of a new construct for skills and competencies, and the division of the process of e-Government implementation into three phases: Formation, Development and Operations. The next chapter on methodology explains the selection of the qualitative multiple case study approach used in the study, and the choice of national government administrations as units of analysis, with national level agencies as embedded units of analysis.

The cases from five developing countries are then presented. Both bottom-up and top-down approaches were used in the analysis of the cases. Interview transcripts were coded

against constructs in the initial theoretical model which included an extension to the Technology Enactment Framework (Fountain 2001) that encapsulated skills and competencies. Each case was analysed to identify skills and competencies that affected the state of implementation at the time of the study, and the factors that influenced skills development. An integrative cross case analysis was used to identify patterns across the individual cases. This analysis highlighted the relative impact of the national level, organisational level, and individual level barriers to implementation as well as key skills and competencies.

A further analysis was conducted to examine how skills and competencies affected the process of technology enactment over time. In order to better understand these mechanisms, the process of e-Government implementation was divided into three phases: prior to the appointment of an ICT vendor; between the time when the vendor is appointed and the system is put into operation, and after the system is put into operation. This allowed the analysis of the importance of different skills at different points in the enactment process. It also allowed for the analysis of how skilled actors affected the enactment process in each of these phases through perception, performance and improvisation, and sensemaking.

Following the presentation of the findings, the study concludes with a discussion of the theoretical implications, and the implications for skills development for e-Government implementation in developing countries.

Chapter 2 Literature Review

2.1 Introduction

This chapter reviews three streams of literature relevant to the study of skills and competencies in e-Government implementation in developing countries. The first stream encompasses the fundamentals of e-Government, and its goals and intentions.

The second stream brings together the many barriers to implementation that have been identified, some of which may be more significant in developing countries. These barriers include national level environmental factors outside the government agency attempting to implement ICT, such as physical infrastructure, social and cultural factors, shared technology components; institutional level arrangements and organisation structures and processes; and individual skills and competencies.

The third stream draws on skills and competencies needed for e-Government implementation. These skills and competencies have been discussed extensively in the information systems (IS) literature, and encompass general management competencies, technology management skills and competencies, and skills and competencies of end-user officers using the ICT system. The need for these skills permeates the entire organisation, and the lack of them presents an additional barrier to e-Government implementation. The role of skills and competencies in the process of enactment is the focus of this study.

2.2 e-Government

The United Nations Department of Economic and Social Affairs (UN DESA) in its e-Government Surveys defines e-Government as “the use of information and communication technology (ICT) and its application by the government for the provision of information and basic public services to the people” (UN 2004, p. 15). Other definitions include “the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees, businesses, and agencies” (Carter & Bélanger 2005). The provision of services to these different stakeholders is sometimes used to divide e-Government services into Government-to-Consumer/Citizen (G2C), Government to Business (G2B), and Government-to-Government (G2G) (UN 2004; Hiller 2001; Yildiz 2007).

Common examples of e-Government are those services provided by government to citizens (G2C). Citizens have used the internet to obtain information on government policies, official data or statistics (Smith 2010). They have also paid fines, obtained driver’s licences,

fishing licences and applied for jobs and government benefits (ibid.). However, it is important to note that e-Government services encompass more than just the internet. They include information and services provided through other ICT channels such as text messaging platforms (SMS), and mobile phones. Services provided through SMS have been used in Jordan, Kenya and Singapore (Qian & Aquaro 2014). Online channels have also been used as part of elections or as consultative channels for policy making processes (Cullen & Sommer 2011; Ramonaite 2010; Margetts 2009).

G2B services include online tax submissions and payments (Tan & Pan 2003), or applications for construction permits (Letch & Teo 2015). G2G systems might include systems that allow for governments to plan and monitor budgets, for instance (Heeks & Stanforth 2007).

While the distinctions of G2C, G2B, and G2G provide a vocabulary with which to discuss the services, it is useful to note that there may be substantial overlaps among the categories. Tax applications, for instance, may have components which serve both business and individual tax payers. A system that allows for online application of construction permits may have a large G2G component to coordinate the many government agencies that are required for the approval of such a permit.

In summary, e-Government can be thought of as the use of information and communication technology, both to reach out and provide services to the wider community, as well as to make efficient the government processes through which those services are provided.

2.2.1 Goals for e-Government

While it is possible to use ICT technologies in government, why should governments do so? The objectives for implementing e-Government can generally be put into two categories: management efficiency, and government transparency.

The first category of objectives are managerial and operational in nature: greater efficiency and reduced costs; increased effectiveness and quality in service delivery (Basu 2004; Hazlett & Hill 2003); and the ability to provide services across large distances and at all hours of the day (Ronaghan 2001; Jaeger 2003). This information age reform of government is sometimes referred to as new public management (NPM) (Cordella 2007; Heeks 1999; Kamarck & Nye 2002). Broader goals for e-Government include enhancing the capacity of the public sector to address particular development issues (Qian 2010). Some authors, however, have suggested

institutional reform is necessary to improve services, and that technology only provides a supporting role (Homburg 2008).

A second category is more political in nature: government integrity, transparency and accountability; democratic participation and responsiveness; and the rule of law (Evans & Yen 2006; Karunasena & Deng 2012). Kossick opines that together with other reforms, the E-Mexico program presents a “unique opportunity to overcome systemic formalism, inefficiency, fraud, mistrust and impunity” (Kossick 2002, p. 183). The internet has also allowed for greater citizen participation in policy making and advocacy (Margetts 2009; Lemieux et al. 2015; Wojtczak & Morner 2015).

Some goals seem to be more challenging than others, and critics point out that, to some degree, the push to adopt ICTs reflects a North American worldview (Thompson 2004), and may not, in fact, result in good governance (Bekkers & Homburg 2007), increased accountability (Wong & Welch 2004), or homogenous socioeconomic development (Wade 2002; Avgerou 2010). Nonetheless, there are many examples (OECD 2003) where the use of ICT in government can improve efficiency, service quality, and policy effectiveness. These goals still drive research in how e-Government can be better implemented.

2.2.2 e-Government in Developing Countries

The use of mobile phones and the internet in developing countries has risen dramatically in the last ten to fifteen years. As of 2015, up to 35% of individuals use the internet in developing countries, and globally mobile penetration has exceeded 95% (ITU 2015). Although there is still a digital divide and the possibility of unequal access, with higher penetration rates, the e-Government services can now reach a wider portion of the citizenry (Basu 2004). Mobile payment systems such as M-Pesa, in Kenya and Tanzania now facilitate businesses, and provide a means to make payments to government agencies (Qian & Aquaro 2014).

There have been various successful implementations by various government administrations. In Tamil Nadu in India for instance, the implementation of e-kiosks in villages has increased the applications for Birth and Death Certificates, and for pensions (Kumar & Best 2006). The time and costs for such applications have also been reduced. In South Africa, the internet has increased access to government information (Lor & van As 2002), and allowed reporting of problems with public services such as electricity and water (Qian & Aquaro 2014). In Peru, telemedicine has increased access to medical care (Miscione 2007).

However, the adoption rate of ICT in developing country administrations generally lags behind those in developed countries (Qian & Aquaro 2014; Arseneault 2005). Because of the relatively low adoption rate of ICT in developing countries, the potential to achieve significant benefits through the use of ICT remains high.

Because of the high potential benefits, and the increasing readiness of developing countries' administrations to attempt ICT adoption, insights into e-Government implementation in that context are likely to have a significant impact. In addition, as many of the administrations in developing countries remain paper based, the closing the skills gap created by the new ICT-enabled work processes is likely to be a large hurdle (See 2.4.4). The generally lower level of ICT skills and competencies in developing countries also presents an opportunity to study how a wide variety of skills and competencies might impact the process of e-Government implementation. Hence, investigators conducted a study on skills and competencies in the context of e-Government implementation in developing countries.

Beyond skills, many significant barriers to e-Government implementation remain. Barriers at the national and institutional levels may impact the development and retention of skills during the process of e-Government implementation. These barriers, as well as the skills gap, will be explored in the following sections.

2.3 Barriers to e-Government implementation in developing countries

Within the United Nations system "there is no established convention for the designation of 'developed' and 'developing' countries or areas. In common practice, Japan in Asia, Canada and the United States in North America, Australia and New Zealand in Oceania, and Europe are considered "developed" regions or areas" (Division 31 October 2013, note c). There is, however, a list of Least Developed Countries (LDCs) which are classified thus based on various human asset indicators such as death in early childhood, literacy and school enrolment, as well as the vulnerability of the economy (UN 2014).

The International Monetary Fund (IMF) classifies the world into "advanced economies" and "emerging markets and developing economies" (IMF 2014, p. 161). There are 36 advanced economies, including 18 in the Euro area, the United States, the United Kingdom, Japan, Australia, New Zealand, Hong Kong and Singapore. For the purposes of this study, developing countries are defined as those which are not "developed" or "advanced economies".

While some argue that basic needs in developing countries, such as clean water, should be met first (Basu 2004), others argue that ICT allows developing countries to plug into the global economy, and that basic needs do not need to be sacrificed if proper strategies are adopted (Akpan 2003). In addition, e-Government holds the potential for increased quality of service delivery, responsiveness, and perhaps increased accountability and democratic participation. So if greater use of ICT in government remains a meaningful goal for developing countries, what prevents them from getting there?

Many barriers to e-Government implementation in developing countries have been identified, ranging from national level environmental factors, barriers at the institutional and organisational levels, and the lack of skills of government officers. Barriers to implementation in developed countries also often apply to developing countries.

At the national level, political goals and funding priorities, lack of existing physical infrastructure and shared technology components, as well as social and cultural factors have been cited as inhibitors (Gupta & Jana 2003; Mukabeta Maumbe, Owei & Alexander 2008; Kumar & Best 2006; Ronaghan 2001; Holliday & Kwok 2004). Some specific issues, such as insufficient physical infrastructure, particularly in the area of communications, may have a greater impact in developing countries (Mbarika et al. 2003). In the case where ICT solutions are adopted from more developed nations, differing cultures may also prove to be a significant inhibitor (Miscione 2007). Political stability is also a particularly important factor for developing countries (Sahay & Avgerou 2002).

At the institutional level, competing interests and lack of coordination amongst institutions and entrenched organisational structures and processes also alter the shape and form of technology implementation (Dawes 1996; Hardy & Williams 2008; Jaeger & Thompson 2003). The lack of appropriate legislation, such as those surrounding electronic signatures and authorisations, may constrain action (OECD 2006; Basu 2004). Actors who may lose or who perceive that they may lose power may resist implementation (Kumar & Best 2006; Madon 1993).

At the individual level, the lack of both technical skills and management competencies within the government has been frequently cited as a cause of implementation failure (Kalu 2007; Schuppan 2014; Parrado 2005). The skills required for technology implementation are wide-ranging, from developing an implementation strategy, redesigning work processes, managing the implementation project, to procuring technology and managing vendors. Securing or developing such skills remains a serious challenge.

A summary of barriers to e-Government implementation in developing countries can be found in **Table 1**. In the following sections, national level environmental factors, institutional and organisational barriers, and gaps in individual skills and competencies will be examined.

2.3.1 Environmental Factors

While there are many challenges in e-Government implementation and adoption across all countries, developing countries operate in a more difficult context, with more developmental goals, lack of infrastructure, and a less mature technological environment.

Funding difficulties are common (Nkohkwo & Islam 2013). It appears to be a common theme across governments in both high- and low-income countries (Edmiston 2003; Jaeger 2003; Gebremichael & Jackson 2006; Mukabeta Maumbe, Owei & Alexander 2008). In addition, as governments progress beyond putting information on websites and move into transactional systems, more funding resources are required (Moon & Norris 2005). In developing countries, however, implementation is complicated by the fact that “developing country environments tend to be politically volatile” (Sahay & Avgerou 2002, p.76), and the *lack of political stability* may result in short-term or politically expedient decisions around ICT (Edmiston 2003; Silva 2002).

While pursuing e-Government in developing countries remains worthwhile, it is acknowledged there are *competing priorities* such as “persisting poverty, lack of clean drinking water, widespread corruption” (Basu 2004, p.115). Some countries are already struggling with the lack of *infrastructure* necessary for an industrialized economy, including adequate power supply; road, rail and seaport accessibility; and telecommunications and associated infrastructure (Wirtz et al. 2015; Siddiquee 2008; Littlejohns, Wyatt & Garvican 2003; Nkohkwo & Islam 2013). Often reaching into remote areas can be costly, and this is true even in developed countries such as the US (Doty & Erdelez 2002) and New Zealand (Deakins & Dillon 2002). Duncombe (Duncombe & Heeks 2002) has suggested the use of intermediaries in service centres, as has been done in Tamil Nadu (Kumar & Best 2006). These infrastructural challenges are high barriers to overcome, and it is, therefore, important that e-Government objectives be integrated with development goals (Mukabeta Maumbe, Owei & Alexander 2008).

Environmental Factors				Institutional Arrangements and Organisational Structures and Processes	Skills and Competencies
Political Goals and Funding	Physical Infrastructure	Social and Cultural Factors	Technological Maturity		
Lack of Funds (Edmiston 2003; Jaeger 2003; Gebremichael & Jackson 2006; Mukabeta Maumbe, Owei & Alexander 2008; Nkohkwo & Islam 2013)	Lack of Accessibility – reaching remote areas, use of intermediaries in service centres (Doty & Erdelez 2002) (Deakins & Dillon 2002) (Duncombe & Heeks 2002) (Kumar & Best 2006) (Mukabeta Maumbe, Owei & Alexander 2008) (Siddiquee 2008) (Littlejohns, Wyatt & Garvican 2003) (Wirtz et al. 2015) (Nkohkwo & Islam 2013)	Lack of Trust between government and non-government stakeholders (Deakins & Dillon 2002) (Basu 2004) (Edmiston 2003) (Jaeger 2003; McDonagh 2002) (West 2004)	Lack of Security and Privacy components (Deakins & Dillon 2002) (Qian 2010) (Wirtz et al. 2015)	Central coordination and planning may lead to procurement and implementation efficiency (Doty & Erdelez 2002) (Hazlett & Hill 2003)	General Management Competencies – Planning, organisation, transformation (Leitner 2006) (Kalu 2007) (Heeks & Stanforth 2007) (Mundy, Kanjo & Peter 2001; Hunnius & Schuppan 2013) (Krishna 2005)
Competing Priorities (Basu 2004) (Mukabeta Maumbe, Owei & Alexander 2008)		Perception of time and need for consensus (Struab, Loch & Hill 2001)	Lack of a working database - to effect the transactions and to record transactions effected - Inconsistent data structures (Layne & Lee 2001) (Dawes 1996)	Competing interests between government agencies limit amount of central coordination. (Dawes 1996) (Braa et al. 2007)	Technology Management Competencies and Technical Skills (Parrado 2005) (Braa et al. 2007) (Settles 2005) (Al-Fakhri et al. 2008) (Moon 2002)
Lack of Political Stability (Sahay & Avgerou 2002) (Silva 2002)		General Literacy (Arseneault 2005) (Warschauer 2003)	Lack of a payment system – to enable the collection of licensing fees and other charges (Ronaghan 2001)	Real or perceived loss of power by traditional local authorities (Kumar & Best 2006) (Madon 1993)	End-User Skills and Competencies (Chen & Thurmaier 2008) (Chou, Chen & Pu 2008) (Braa, Monteiro & Sahay 2004) (Schuppan 2014) (Madon 1993)
				Lack of Enabling Legislation (OECD 2006) (Basu 2004)	

Table 1 Barriers to e-Government Implementation in developing countries

Systems created in the more developed countries encapsulate many values including those around time and decision making. Cultural differences such as the need for consensus, perceptions of time and government-citizen relationships exist, and direct transplantation of ICT systems may not be well received (Struab, Loch & Hill 2001; Ciborra 2005; Miscione 2007). Issues of *privacy and trust in government* are also cited by several authors (Basu 2004; Edmiston 2003; Jaeger 2003; McDonagh 2002; West 2004) as barriers. The citizens' tolerance and trust in government facilitates the provision of personal information to the government, permits the identification of individuals, and thus the electronic distribution of government services to specific individuals. In a low-trust environment, more checks and balances are demanded, making it more difficult to implement and adopt e-Government applications.

In the general population, there is also the issue of literacy and general education (Arseneault 2005; Warschauer 2003). If there is a low literacy rate, then the number of people who can read and understand government policy, and so interact with the government through electronic means will be small. In addition, the issue of access and accessibility cannot be solved just by the distribution of computing equipment (Warschauer 2003). Often broader social changes, including changes in the education system may be necessary to create the environment where IT can be used effectively.

One other environmental factor relates to the general level of *technological maturity* within the country. The availability of technology components that secure privacy can encourage adoption by increasing trust (Nkohkwo & Islam 2013; Wirtz et al. 2015; Qian 2010). Several other authors allude to some technology components necessary to complete transactions online: "a working database" is needed (Layne & Lee 2001), with structures that allow sharing of information (Dawes 1996) and a payment system (Ronaghan 2001, p.19 Box 8). These databases and payment systems are likely to have long implementation lead times and would require extensive planning and cooperation within and without the government (the telecommunications and financial sectors, for instance). It may also require significant government reform, reorganisation, or cooperation – between local, regional and national level entities for instance. An assessment in the UN e-Government Survey 2010 suggests that the "complex integration that is required among various systems", and "secure networks" (Qian 2010, p. 81) hinder the implementation of transactional systems. The presence or absence of these technological components thus facilitates or impedes the development of other services.

In summary, at the national level, factors such as political goals and funding, the state of physical infrastructure, social and cultural factors, and the technological maturity within the government influence e-Government implementation.

2.3.2 Institutional Arrangements and Organisational Structures

Organisational structures and institutional arrangements can also be barriers to implementation. Enabling legislation that legitimizes electronic transactions, for example, is a necessary precursor, and the lack of such legislation may stymie e-Government implementations (OECD 2006; Basu 2004).

Organisational processes and relationships may need to be significantly changed if the full benefits of ICT implementation are to be realized (Davenport 1993a; Venkatraman 1994). Implementation is especially complicated when government agencies have multiple stakeholders whose interests are not completely aligned, or when the project itself has multiple stakeholders, even if they reside within the same agency (Gascó 2005; Bellamy 2000). Even if there appear to be clear benefits, implementation risks in transitioning from the current process to the new technology-enabled process may cause stakeholders to be cautious in lending support to the project (Brynjolfsson & Hitt 1998; Rocheleau 2003).

Institutional arrangements such as election cycles and political structures also contribute to the political environment described earlier. For example, leaders focus on the short term, perhaps with regard to election timelines (Sahay & Avgerou 2002; Silva 2002), and thus make inefficient investment decisions.

The internet may also have a disintermediating effect, especially when multiple levels of government are involved. Through bypassing current institutional arrangements, e-Government services may cause a *real or perceived loss of power* by traditional local authorities (Kumar & Best 2006; Madon 1993). To prevent such loss of power, local authorities may refuse to cooperate and delay e-Government adoption, or else attempt to find ways to re-intermediate.

Better *central coordination* and planning can lead to procurement and implementation efficiency and greater sharing of information between various government agencies (Doty & Erdelez 2002; Hazlett & Hill 2003). This, in turn, should lead to higher service levels. Hardy (Hardy & Williams 2008) also notes that multiple stakeholders tend to make e-procurement complex and less efficient.

However, competing interests between government agencies may limit the amount of central coordination that is achievable (Dawes 1996; Braa et al. 2007). Laws and regulations also define the roles and set boundaries around what government agencies can do. This can sometimes create a 'silo' effect (Dawes 1996), where information sharing is limited. Multiple agencies, each with their own role, may also independently assess the merits of a singular

application, such as a building permit (Sing & Zhong 2001; Letch & Teo 2015). This may create an unnecessarily long and inefficient assessment process, and may not allow for more efficient forms of organisation that information technology can make possible.

Multiple levels of government can also lead to complexity (Cresswell & Pardo 2001). Many large countries have federal, state or provincial, and municipal governments. This may result in overlapping roles, conflicting institutional logics, or gaps in service provision when accountability is not clearly defined. The clarity of roles of these governments at different levels, and the level of cooperation in areas where authority may overlap, can inhibit or promote the implementation of e-Government initiatives.

Organisational structures and institutional arrangements remain barriers to implementation in developing countries, just as they are in developed countries. However, there have been examples where adaptations that take into account local contexts and cultures can still allow for meaningful gains in efficiencies, while gaining acceptability within the community (Bada 2002).

2.4 Skills and Competencies

Most organisation theorists agree that “technology includes not only the hardware used in performing work, but also the skills and knowledge of workers...” (Scott 2003, p.231), and Fountain suggests that “enacted technology is the perception, design and use of objective technologies” (Fountain 2001, p.98). Using this social constructivist view of technology, skills of the workers and management must, therefore, also influence the final technological designs and organisational outcomes of e-Government implementation.

The lack of skills and skilled employees has been cited as a barrier to e-Government implementation. Often cited are the lack of technical skills (Al-Fakhri et al. 2008; Leitner 2006; Parrado 2005; Moon 2002) and ICT literacy skills (Chen & Thurmaier 2008; Chou, Chen & Pu 2008; Leitner 2006; Madon 1993).

However, some authors (Hunnius & Schuppan 2013; Parrado 2005; Schuppan 2010; Settles 2005) suggest that what is required extends beyond the limited definition of skills – the ability to carry out a specific task quickly and accurately. Instead, effective e-Government implementation also requires competencies — skills, knowledge, ability and even motivation (Hoffmann 1999; Winterton, Delamare-Le Deist & Stringfellow 2005). Often skills are related to lower level tasks, and competencies used to describe abilities of managers.

General Management Competencies	Technology Management Competencies	End-User Skills and Competencies
<ul style="list-style-type: none"> - Strategic Planning and Leadership (Leitner 2006; Parrado 2005; Hunnius & Schuppan 2013; Kalu 2007) - Organisational Design and Transformation (Mundy, Kanjo & Peter 2001; Hunnius & Schuppan 2013; Krishna 2005; Homburg 2002; Heeks & Stanforth 2007) - Process Design and Management (Parrado 2005; Davenport 1993b; Hunnius & Schuppan 2013; Settles 2005) - Hybrid skills – bridging technology and organisation (Mundy, Kanjo & Peter 2001; Schuppan 2010; Parrado 2005) - Contextual adaptation across cultures and organisations (Heeks 2005) 	<ul style="list-style-type: none"> - e-Government Strategy and Planning (Parrado 2005; Hunnius & Schuppan 2013) - Data Governance and Management (Braa et al. 2007; Parrado 2005; Dawes 1996) - Project Management (Parrado 2005; Hunnius & Schuppan 2013; Leitner 2006; Settles 2005) - Procurement and Vendor Management (Leitner 2006; Settles 2005) - Technical skills and Implementation competencies (Al-Fakhri et al. 2008; Leitner 2006; Parrado 2005; Moon 2002) 	<ul style="list-style-type: none"> - ICT literacy (Chen & Thurmaier 2008; Chou, Chen & Pu 2008; Leitner 2006) - Ability to use specific ICT systems designed to support specific organisational processes and tasks. (Braa, Monteiro & Sahay 2004; Madon 1993; Kumar & Best 2006; Settles 2005) - Increased ability to multi-task (Schuppan 2014)

Table 2 Categorisation of e-Government Skills and Competencies

What skills and competencies are then needed for successful e-Government implementation? Many skills and competencies have been identified, and for the purposes of this study, they are classified into three categories (See **Table 2**):

- a) General management competencies — skills and competencies as necessary for the leadership and management of a government department;
- b) Technology management competencies and technical skills – skills and competencies for technology management and technical and engineering groups within the government department; and
- c) End-user skills and competencies – skills and competencies for the community of people who use ICT systems within the department or in the wider community.

These categories are in some cases overlapping. For instance, is there some point at which an end-user who installs and uses software on his or her digital device becomes “technically skilled”? The amount of digital storage to acquire and install to support ongoing technical operations might be considered an engineering and “technology management

decision". However, would such a decision become a "general management decision" based on costs and benefits to the department at some point? Despite these overlaps, the categories reflect the skills expected of different actors in the roles they play in the government agency — personnel in the ICT departments would be expected to display competence in technology management and technical skills, for example.

2.4.1 General Management Competencies

Some of the competencies required in e-Government implementation are not unique to e-Government. Rather they are general management skills required to run any organisation well. These competencies include strategic planning and leadership (Leitner 2006; Parrado 2005; Hunnius & Schuppan 2013) – the ability to set the direction of the organisation, and to harness organisational resources to accomplish organisational goals (Kalu 2007; Heeks & Stanforth 2007). Other general management competencies such as budgeting, financial management and human resource management are also required (Settles 2005). In the context of e-Government, this also means identifying and prioritizing organisational needs so that a sufficient amount of the limited organisational resources can be devoted to key initiatives to ensure their success.

However, implementing e-Government also requires new capabilities. To be truly transformative, its implementation must change the processes, structure and people (Heeks 2002; Venkatraman 1994; Settles 2005).

New processes have to be designed that take into account the capabilities and limitations of the new information technologies. The ability to do things faster also creates the opportunity for errors to be propagated more rapidly. Hence, new IT-enabled processes must also account for the shift in operational risk. The organisation must, therefore, acquire the competency for new process design and management (Parrado 2005; Davenport 1993b; Hunnius & Schuppan 2013).

These new processes will often include changes in, and sometimes elimination of, some of the roles and responsibilities of parts of the existing organisation — thus modifying structure and people. Hence, the competency to restructure the organisation, through engaging multiple stakeholders such as labour unions, employees, and possibly partner organisations is essential (Leitner 2006). The ability to work with partner organisations to overcome institutional barriers to information sharing, or integration of work across organisational boundaries (Settles 2005) (See 2.3.2) would also lead to more efficient solutions.

These complex competencies are sometimes called hybrid (Mundy, Kanjo & Peter 2001) or “cross-cutting” (Parrado 2005), because they necessitate the combination of information systems expertise and the functional management expertise within the organisation. Hybrid competencies may be developed by IS professionals acquiring functional and general management competencies or by functional managers acquiring IS management competencies.

In addition, e-Government systems need to be deployed in context – the organisation or department, the culture of the country and its stage of economic development (Heeks 2005). For developing countries, proponents or project managers of e-Government systems need to be able to adapt solutions to the local context. This may be especially challenging if left to an IT vendor which is not part of the organisation, and comes from a different country.

2.4.2 Technology Management Competencies and Technical Skills

Parallel to the general management competencies are a set of technology management competencies and technical skills. IT managers need to be able to develop an e-Government strategy and plans (Parrado 2005; Hunnius & Schuppan 2013) that align technology strategy with the overall goals and strategy of the government department or ministry. They need the ability to design and develop standards and architecture: technical standards that allow for connectivity, reliability and availability; and information architecture and data governance standards (Braa et al. 2007; Parrado 2005; Dawes 1996) to enable data sharing across government departments. They also need to put in place governance processes in order to ensure conformance to these standards, and to manage data quality and integrity.

Beyond putting in place management strategy, planning and governance processes is the essential ability to guide the implementation from start to finish. Project management has been identified as an essential skill in the journey of transformation (Parrado 2005; Hunnius & Schuppan 2013; Leitner 2006; Settles 2005). The role of managing the e-Government project often falls on someone in the IT department, although the role may also be filled by someone from the functional management. Project management is also multi-dimensional, and requires social as well as technical competencies (Hunnius & Schuppan 2013). Beyond coordinating technical teams on the engineering work, project managers need to work with senior management and leaders in government departments to facilitate the transition from the pre-IT-enabled organisation to the post-IT-enabled one.

There is also a long list of technical skills (Parrado 2005) surrounding system development, network infrastructure design and architecture, network and database administration, system implementation and maintenance, and end-user support. Because IT

systems are commonly bought, and these services are outsourced by the government, it is not clear to what extent all of these skills need to be retained within the government agency. However, if the IT systems are outsourced, this creates the need for competencies surrounding outsourcing – vendor and systems evaluation as part of the procurement process, the creation of fair contract terms, vendor performance management, dispute management and other related disciplines (Leitner 2006). Some amount of technical competency still needs to be retained within the organisation, otherwise, public officials will not have the knowledge to manage the vendors' performance and contracts (Settles 2005).

2.4.3 End-user skills and competencies

The third category of skills and competencies are those related to the community which will eventually use the IT system: the government officials who will use the system in the course of their work, and the members of the public who wish to interact with the government through the electronic means.

Within the government, IT literacy and the use of technology for person-to-person communication tends to ease the transition to using specialised IT systems (Chen & Thurmaier 2008; Chou, Chen & Pu 2008). Officials who are already familiar with computing equipment are more likely to adopt IT-enabled processes.

Government officials also need to learn how to use the specialised IT systems for their functional work. While local adaptations (Bada 2002) and selective appropriations (Fountain 2001; Gil-Garcia 2012) are expected as part of the enactment process, the inability to create a sustainable core of government officials who will use these specialised IT systems will result in a failure in implementation. Wealth disparities amongst different regions in a country can complicate the development of such a pool of IT-enabled officials because skilled personnel tend to congregate in wealthier regions (Sandiford, Kanga & Ahmed 1994), and may refuse to move to less wealthy regions to transfer skills (Simwanza & Church 2001). Concerted and structured efforts to develop skills in the use of IT in functional work will facilitate successful implementation (Braa, Monteiro & Sahay 2004).

Beyond the competency to operate the computing equipment, government officials are likely to experience a change in their roles. As work is integrated and automated, there is a requirement that front-office employees become more knowledgeable about the services provided across the departments so that they can present a holistic "single window" view to the citizen (Schuppan 2014). This requires that they learn about multiple processes within the department or agency, which is a challenging change.

2.4.4 Skills and Competencies in Developing Countries

Implementing e-Government is not a one-off project. It is a continuing change in the way the government makes decisions, and delivers services to its employees, citizens and businesses. As illustrated in the previous section, a wide variety of skills and capabilities are necessary in order to make the transition from a non-IT-enabled government to an IT-enabled government.

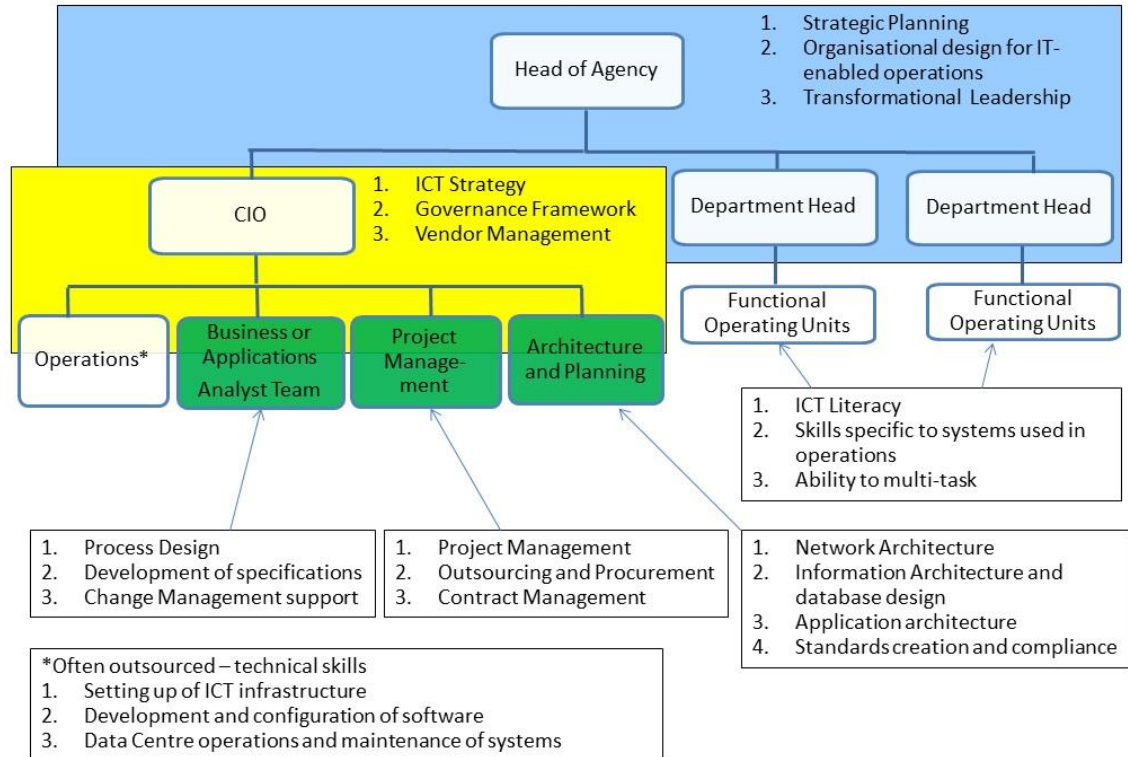


Figure 1 Skills and Competencies in an Archetypal Government Agency

Skills and competencies for e-Government implementation encompass strategy, planning and transformational leadership at the senior management level, to standards and governance by the Chief Information Officer and middle management, to specialist skills in the IT department, to more holistic and multiple process skills within the functional departments. If skills and competencies identified in Sections 2.4.1 to 2.4.3 were mapped into an archetypal organisation, it can be observed that these required skills and competencies permeate the entire government agency (See [Figure 1](#)). In the wider context, the general public also needs to acquire general literacy and IT literacy skills in order to interact with the government through electronic means. This skillset is linked to national level environmental factors, however, and is not the focus of the study.

The importance of skills and competencies in e-Government implementation calls for a greater understanding of how they affect the process of implementation. This study aims to enhance that understanding by extending current models of e-Government technology adoption and implementation.

In developing countries, these skills and competencies need to be developed in the context of the multitude of environmental challenges (See 2.3.1) they already face. In addition, the retention of skills within the government, already a challenge within more developed countries (Settles 2005), is more acute in developing countries, as they face competition not only from the private sector for competent personnel, but also from the developed countries.

While there remains a distinction between skills and competencies, many managers in government departments do not differentiate between the two, often discussing only an ability to perform or manage. For the purposes of this study, individual skills and competencies within the government agencies and departments will be examined.

2.5 Objective of Study

These streams of literature surveyed in the foregoing sections suggest the following:

a) Implementing e-Government appropriately can promote efficiency and effectiveness in the delivery of government services, potentially increase transparency and political participation, and facilitate economic growth;

b) Many barriers exist that inhibit implementation in developing countries, both at the level of the national context, as well as the level of the institutional context; and

c) One of the major barriers is the lack of appropriate skills and competencies within the actors implementing e-Government.

The purpose of the study is to explore the roles that skills and competencies play in the process of e-Government implementation in developing countries. By doing so, this study aims to investigate how skills and competencies can best be developed and retained to obtain better implementation outcomes.

2.6 Conclusion of Review

The use of ICT in government holds great potential for development and economic growth. It can lead to efficiency and effectiveness, and increased quality in the delivery of

government services. In some circumstances, it can lead to greater accountability and transparency by government agencies.

However, the process of technology adoption by government agencies is complex. The context of the external environment plays a role, perhaps more so in developing countries. These environmental factors include hard factors like the availability of funding and competing developmental goals, the physical infrastructure available within the country, and technology components that are already available. Soft factors like trust in government, cultural and social contexts, also matter. The enactment process is also often constrained by institutional arrangements and organisational structures and processes.

Skills and competencies play a major role in the successful implementation of ICT. General management competencies, ICT management competencies and technical skills, as well as skills of the end-user community affect the eventual outcome of technology implementation. For organisations in developing countries, which are more likely to be paper-based, the challenge to acquire and retain skills and competencies for successful e-Government implementation is significant. The importance of skills and competencies in the process of enactment makes this an area that merits further study.

In the next Chapter, various theoretical bases and frameworks will be explored. These theoretical bases and frameworks were used in the development of the *a priori* theoretical lens used in this study.

Chapter 3 Development of the Theoretical Lens

The IS literature contains many studies with findings that individual skills and competencies have a significant impact on ICT implementation. Therefore, this study aims to explore the role that skills and competencies play in the process of e-Government implementation. It will be conducted in the context of developing countries, where the pace of ICT adoption in government is accelerating, and where skills development may be particularly challenging. By doing so, this study aims to lend insight to how skills and competencies can best be developed and retained to obtain better implementation outcomes.

This chapter reviews the literature that discusses the theoretical bases and frameworks from which theoretical lens for this study was constructed. For the purposes of this study, it was necessary to identify a theoretical framework that adequately captures the complexity of the implementation process. In addition to the analytical framework, in order to assess the impact of skills and competencies on e-Government implementation, the outcomes of implementation (or attempts at implementation) must first be differentiated.

The following sections will review theoretical frameworks used in examining the process of technology enactment, discuss the possible gaps and possible ways to close these gaps. They will also identify measures of e-Government implementation success and failure. The *a priori* theoretical lens that was used in this study, developed on the basis of these reviews in the subsequent sections, and its relation to the research questions will also be discussed.

3.1 Theoretical Bases and Frameworks

This section discusses theoretical frameworks that may be used to explore the roles that skills and competencies play in the process of e-Government implementation in developing countries. Two broad approaches are examined. Firstly, stage models, which are widely accepted and have been used as the basis for much research in the e-Government domain, are reviewed. Secondly, the Technology Enactment Framework, which draws upon concepts from a range of organisational theories, is examined.

In addition, skilled actors can also influence e-Government implementation, and the mechanisms by which they can influence implementation outcomes are reviewed. e-Government implementation also encompasses a sequence of activities involving different stakeholders that happen over time. In order to understand how skills and competencies influence e-Government implementation, these activities must first be understood. Thus, several models of these activities are also reviewed.

3.1.1 Stage Models

Early measures of e-Government development focused on the functionality of web services, and what e-services were available to citizens and the business community.

Various authors suggested that there was a sequence in development activity which starts from information provision, and ends with horizontal integration across government agencies and other transformational events. These “stage models” attempt to measure the development or maturity of e-Government implementations. Stage and maturity models have a long tradition in the IS literature, and at least 15 such models have been developed since the first academic publication of a stage model by Lane and Lee (Debri & Bannister 2015).

This section will briefly describe three models: the first, which is one of the most cited models by Lane and Lee (Layne & Lee 2001); the model which became the basis of the UN e-Government Survey (Ronaghan 2001); and one developed in Singapore, a leader in e-Government implementation for many years (Chan, Lau & Pan 2008). These models primarily focus on the internet and the web interface. As a contrast, a fourth model (Wescott 2001) describes an inside-out progression, starting with the use of technology within government agencies.

Layne and Lee (Layne & Lee 2001) (See **Figure 2**) suggest that there are four distinct developmental stages representing increasing integration across technological and organisational complexity:

- (i) cataloguing – online presence, and online presentation of government information;
- (ii) transactional – the connection of internal government systems to online interfaces, with a working database to allow transactions like licensing and fines to be made electronically;
- (iii) vertical integration – integration of databases between regional or local governments and national level databases, such as a business licence database at the city and state level in the United States.
- (iv) horizontal integration – integration between disparate government agencies with different functions, such as between a tax collection agency and an unemployment benefits agency.

Ronaghan (Ronaghan 2001, p.2) in a project for the United Nations Division for Public Economics and Public Administration (UNDPEPA) proposed five-stages for e-Government:

- (i) Emerging — An official government online presence is established.

- (ii) Enhanced — Government sites increase; information becomes more dynamic.
- (iii) Interactive— Users can download forms, e-mail officials and interact through the web.
- (iv) Transactional — Users can actually pay for services and other transactions online.
- (v) Seamless — Full integration of e-services across administrative boundaries.

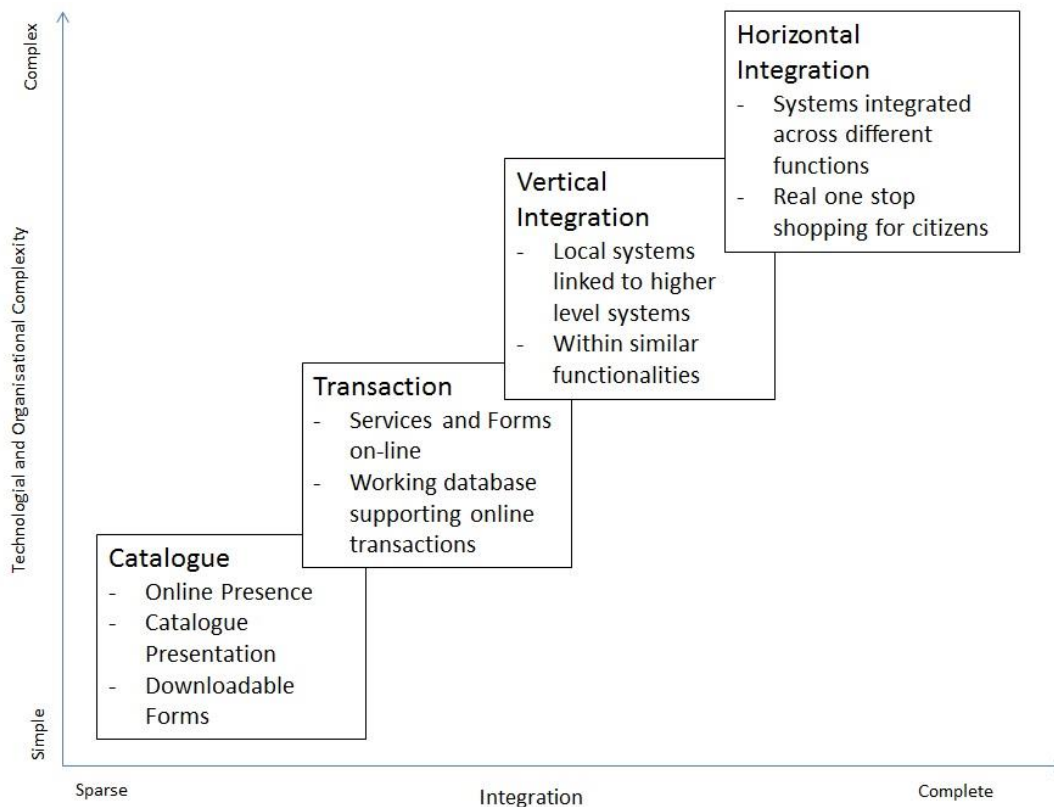


Figure 2 Stages of e-Government Development (Adapted from Layne and Lee, 2001)

Chan (Chan, Lau & Pan 2008) describes a “Five Stage e-Service Content Development Model” used by the Singapore Government:

- (i) Publish – translation of information already available in other forms into an online format;
- (ii) Interact – part of a government transaction can be initiated online, but must be completed through the post or other channels;
- (iii) Transact – all of the transaction can be completed online;
- (iv) Integrate – integration of services across government agencies; and
- (v) 3P Integration – integration with the private and people sectors.

Step (v) in this model has also been examined by Burt (Burt & Taylor 2008) to in relation to “partner agencies” to governments.

All these staged development models have some similarities in that they attempt to describe a progression pathway for the electronic delivery of government services and bear many similarities. They identify common stages, such as the ability to complete a transaction as a significant step upwards. They also focus primarily on the provision of services via the internet, and measure the functionality of the external interface, and suggest that progression then moves inwards towards integration of government services. Wescott (Wescott 2001, p.6-7), proposes a different model and suggests that there are six stages of e-Government, which moves from inside government towards the external interface:

- (1) setting up of an email system and internal network – improving internal communications and decreasing information handling costs;
- (2) enabling inter-organisational and public access to information – supporting functional processes and sharing information between government organisations;
- (3) allowing two-way communication – by publishing communications channels such as telephone or fax numbers, or allowing emails to be sent to the government;
- (4) allowing exchange of value – by allowing transactions such as welfare claims, visa applications or licence renewals;
- (5) digital democracy – by allowing citizens to vote, or express opinions and influence policy; and
- (6) joined-up government – where information and services from various government agencies are integrated, and services are provided across different functions.

Hiller and Belanger (Hiller 2001) expanded these models to cover the dimensions of interactions between government-to-government, government-to-citizens, and government-to-businesses. More recently, Andersen and Henriksen proposed that maturity should be measured along two dimensions: the extent to which they are customer centric, and the extent to which they are activity centric (Andersen & Henriksen 2006). Others have realized that achieving “joined-up government” is challenging, and have developed staged models to expand on how it might be accomplished (Klievink & Janssen 2009).

3.1.1.1 Shortcomings of Stage Models

Some authors (Coursey & Norris 2008) challenge the validity and usefulness of these models in predicting developmental paths, and others question their applicability in developing nations (Mukabeta Maumbe, Owei & Alexander 2008). Nonetheless, a form of stage model measurement has been included by the United Nations e-Government Survey since its inception (Seema Hafeez 2003; Bertucci 2005 ; Bertucci 2008; Qian 2010; Qian 2012; Qian & Aquaro 2014).

These models provide a basis against which e-Government implementation can be benchmarked and compared across developing countries. To some degree, they highlight the presence or absence of essential technological components like databases and payment systems which are necessary for transactions to be completed online. The surveys have also evolved to include other dimensions beyond measuring the online presence through such models. The Survey's e-Government index has included amongst its components measures of telecommunications infrastructure and human capital. Most recently, the participation rate of citizens has been added as a supplementary measure.

It useful to note that the UN survey, while measuring availability and quality of services available on the web, does not measure all the goals expressed for e-Government implementation discussed in Section 2.2.1. For example, it does not encompass wider measures of management efficiency, such as reduced costs or increased effectiveness and quality of service delivery. Neither does it measure accountability or transparency, the other expressed goal of e-Government. The latest supplementary measure of participation rates, does however, the measure usage of e-Government services to some degree.

Stage models provide a useful benchmark across many countries, and give some environmental context, especially with regard to telecommunications infrastructure. These models have provided a useful vocabulary, and consistent benchmarks when comparing e-Government development across various countries. However, these models fail to describe why governments are at a particular stage of development, or how they might move from one stage to another. In order to address the shortcomings of stage model approaches, the investigation and analyses conducted in this study turns to frameworks drawn from institutional theory which provide more insight to the process of technology implementation. In particular, the Technology Enactment Framework (Fountain 2001) together with refinements proposed by Cordella (Cordella & Iannacci 2010) and Gil-Garcia (Gil-Garcia 2012) account for many of the phenomena observed in this process.

3.1.2 The Technology Enactment Framework

The Technology Enactment Framework (TEF) (Fountain 2001) provides a useful way to understand the process of e-Government Implementation. Enactment is the process of human action, of bringing events into existence and setting them in motion (Weick 1988). The enactment perspective views such actions as taking place in a social context, and is a social process which may create real objects (such as a new ICT system), but also social constructions which give these objects significance and meaning (ibid.) In implementing ICT, the organisation

creates not only the physical system, but also rules and knowledge about how the work can be performed with the new system (schemas), resources to accomplish that work, and norms governing how the system can be used appropriately (Orlikowski 2000).

The Technology Enactment Framework accounts for important phenomena that occur in the process of technology implementation. For instance, technology features are often selectively used by human actors (Gardenier 1981). The introduction of technology may trigger changes in organisations (Barley 1986). In addition, organisational and institutional characteristics shape and are shaped by human behaviour, and as a consequence shape the nature of technology (Orlikowski 1992). The Technology Enactment Framework has its foundations in institutional theory (Powell & DiMaggio 1991; Scott 2003), but incorporates ideas found in structuration theory, and the socio-technical view of understanding and locating technology in context (Kling 1980).

In this framework (See [Figure 3](#)), Fountain differentiates between the *objective technology*, which is the hardware, software, telecommunications infrastructure and other digital devices used in the implementation of an ICT system, and the *enacted technology*, which is the perception, design and use of the objective technology in the context of the organisation and institution. Often only selected features of the objective technology are used, and may be appropriated for purposes other than the designed intent. The process by which the objective technology is put to use creates the enacted technology.

This differentiation is important as human actors often use technology in a selective fashion, choosing to use certain functions, while ignoring others. This might be because the technology may be difficult to use: marine officers may ignore computerized collision avoidance systems because operating such systems takes too much time out of other tasks (Gardenier 1981). Or it might be because the fear of losing skills necessary to operate in the absence of such technology: some pilots were initially reluctant to use displays that decreased the effort needed to land planes, because they might lose the ability to land planes in the absence of such displays (cited in (Perrow 1983)). Hence, the technology as it is put to use in the organisation may differ substantially from what was originally planned, and may or may not include all its capabilities.

Institutional arrangements refer to guidelines of appropriate behaviour within the organisation (March & Olsen 1984). Behaviour may be guided through explicit rules or laws; the values and expected standards of behaviour; and the meanings of shared symbols and experiences of such behaviour (Scott 1995). Adherence to these guidelines is the means through which action gains legitimacy. Over time and repeated conforming performances, these arrangements provide stability, meaning and order in organisations (Selznick 1996). Within

government, many government agencies are constituted through laws and regulations which determine their existence and these laws constitute part of the institutional arrangements which guide and constrain behaviour within the agencies.

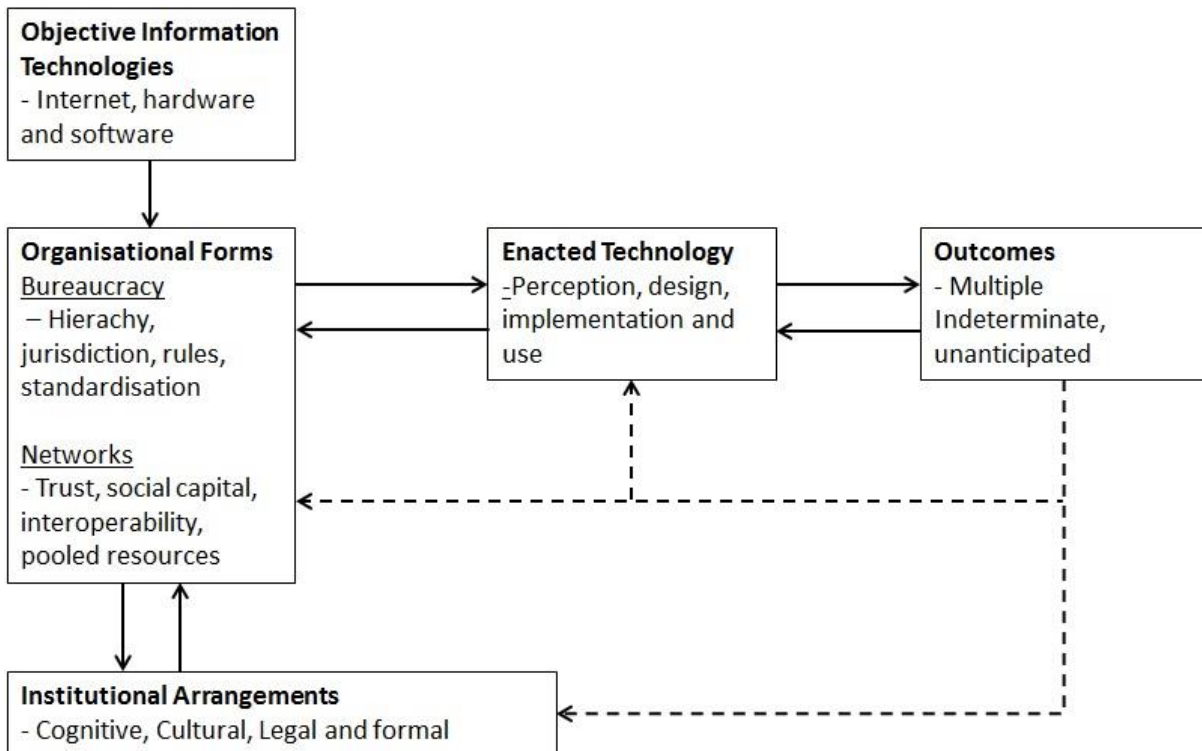


Figure 3 Technology Enactment Framework (adapted from Fountain 2001, p. 91)

The technology which is enacted is affected by the *organisational forms* in which the technology is embedded. Organisational characteristics within the government agency include the formal reporting structures, informal working relationships, work processes, management policies and whether or how they are enforced (Fountain 2001). In addition to this, in the context of an e-Government initiative, there is also the project organisational structure: how the project manager and his team are constituted, how the project team is governed and resourced, and if multiple agencies are involved, the formal and informal working arrangements among the agencies (Yang & Maxwell 2011; Davis 1982).

Institutional or organisational demands might lead to the selective use of technology. For example, in order to meet production targets, nuclear plant operators may disable safety devices and automated systems (Perrow 1984). The enacted technology is thus a result of a complex process where human actors, guided or constrained by their institutional arrangements or organisational forms, adapt and adopt the objective technology for use in their context. The *outcomes* or results of such a process are “multiple, unpredictable and indeterminate” (Fountain

2001, p. 98). This conclusion contrasts with earlier authors who tended to portray technology as an external force which, when applied to organisations, is likely to transform them in some predictable way. This included the possible elimination of the role of middle managers (Leavitt & Whisler 1958), and the alteration of the locus of decision making (Carter 1984).

In the context of e-Government, it is unlikely that a better government can be created simply by the introduction of ICT (Bekkers & Homburg 2007). To maximize the use of ICT, work practices, organisation structures, and even laws may need to be changed (Cresswell & Pardo 2001; Dawes, Pardo & Cresswell 2004; Gascó 2003; Torres, Pina & Royo 2005; Tolbert, Mossberger & McNeal 2008; Basu 2004). Improvements in technology adoption are more likely to be driven by improvements in government than by technology innovation (Moon & Norris 2005). These organisational changes, which affect interests and positions of actors within the organisation (Homburg 2002), are very difficult to implement. Successful e-Government implementation often involves the negotiation of various interests, and must include overcoming organisational and institutional barriers, or working within their boundaries (Bada 2002).

3.1.2.1 Enhancements to the Technology Enactment Framework

The Technology Enactment Framework has been used and refined in several studies. In the context of e-Government, Cordella (Cordella & Iannacci 2010) uses the framework as a basis for analysis, and enhances it by showing how e-Government policy shapes technology choices and eventual outcomes. Gil-Garcia (Gil-Garcia 2012) included environmental factors beyond the institution, and tied it to some of the espoused goals of e-Government, such as efficiency, greater service quality, and transparency.

Cordella examined a case involving the design and implementation of a new ICT system in the criminal justice system of England and Wales. In the criminal justice system, the Crown Prosecution Service (CPS) made decisions on which cases to investigate, and the Police investigated cases and determined charges to be prosecuted. This separation of duties was meant to produce independence and impartiality in prosecution decisions. As a result, the Police and the CPS set up separate and independent ICT systems in support of their operations. This created some amount of duplicate data-entry and consequent transcription errors.

The government subsequently established a government modernization agenda based on NPM principles of efficiency and accountability. This “joined-up” government agenda introduced reforms aimed at improving inter-agency cooperation. When applied to the criminal justice system, legislation was introduced to require the CPS to determine charges against

suspects early in the process so as to reduce unnecessary work related to charges unlikely to result in successful convictions. Associated with the reform was an e-Government policy to introduce an ICT system, the Criminal Justice Exchange (CJE), which facilitated data exchanges between the ICT systems in the CPS and the Police. This supported the reform that the CPS determine charges early, by requiring that police investigators share information on investigations with CPS prosecutors.

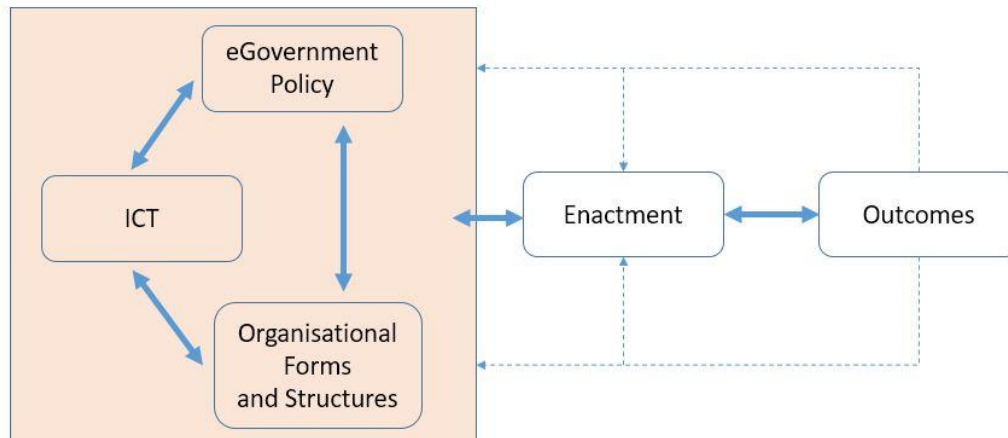


Figure 4 The e-Government enactment framework (adapted from Cordella 2010)

Cordella argued that reform policies and the associated e-Government policies shaped the technology that was chosen and implemented (See [Figure 4](#)). The technology then became the carrier of policy aims by enforcing the distribution of work between the different agencies. The enforcement through technology then had consequent effects on the organisational forms and structures. Organisational norms also affected the enactment process and shaped the selective adoption of the technology and modified e-Government policy. These effects suggest that the Technology Enactment Framework should be refined to include the impact of e-Government policy on the enactment process.

Gil-Garcia used the Technology Enactment Framework as a basis for analysing website implementations across 50 states in the United States of America. Using quantitative methods (partial least squares), he demonstrated that management strategies and practices, general organisational characteristics (such as IT personnel and budgets), and environmental factors (such as the overall size of the economy) directly influenced the functionality of state websites.

Supplemented with further evidence from two qualitative case studies from New York and Indiana States, he proposed a theoretical model that expands the Technology Enactment Framework to include environmental factors and a direct relationship between institutional

arrangements and the enactment outcomes. A detailed discussion on Gil-Garcia's framework on Enacting e-Government Success can be found in Section 3.3.

The two enhancements and refinements to the Technology Enactment Framework have increased the explanatory power of the framework and its usefulness in studying the process of enactment. However, the Framework has two potential gaps. Firstly, it does not explicitly account for the role of skills and competencies in the enactment process. Secondly, and while enactment is a process, the framework does not account for the dimension of time. The following sections will discuss how skilled actors influence the process of enactment, and the different activities that occur over time in the process of enactment.

3.1.3 The Role of Skilled Actors in Enactment

In order to take into account the role of skilled actors in technology enactment, the role of human agency needs to be considered (Boudreau & Robey 2005). In addition, while Fountain discusses *technology* enactment, the concept of enactment applies in a wider context. It is derived from interpretive sociology, and views organisations as being socially constructed systems of shared meaning (Smircich 1985). Human actors actively shape their environments and organisations, through their social interactions with each other (ibid.). The role of human actors modifying social constructions in other contexts (Feldman & Pentland 2003), or creating them in response to crises (Weick 1988), is thus also relevant to technology enactment.

Technology is best understood as a duality: its physical and material characteristics and the social constructions attached to it (Orlikowski 1992; Weick 1988). The material aspects of technology artefacts may constrain or shape human action: for example, low bridges may prevent buses from passing under them (Winner 1980). However, human actors also selectively use features of these artefacts, and create their own interpretations of how they may be used. Technology artefacts are also "inconsequential until they are acted upon, then incorporated retrospectively into events, situations, and explanations" (Weick 1988, p. 307).

A similar duality exists between organisation structures and human action. While structures and routines may constrain human action by prescribing acceptable and legitimate actions, human actors are capable of improvisation (Weick 1998; Brower & Abolafia 1996; Carr & Brower 2000), and can introduce novel actions in the performance these routines. Leaders and managers may still choose amongst different strategies in attaining organisational objectives (Werle 1998). Indeed, human actors are capable of conceiving the future, and this 'projective dimension' allows them to be "inventors of new possibilities for thought and action" (Emirbayer & Mische 1998). These innovations may then be selected and incorporated into the

ostensive, organisationally-accepted descriptions of the routine (Feldman & Pentland 2003), thus modifying organisational structure.

Central to these ideas is that human agency plays a significant part in technology enactment. As a consequence of human agency, the enacted environment can vary. It may be one where end-users avoid using the technology; one where they use it in a superficial or disinterested fashion; or one where organisational practices are significantly transformed (Boudreau & Robey 2005).

What might influence these and other outcomes (See 3.2) of e-Government implementation? The IS literature identifies many skills and competencies as necessary for successful e-Government implementation (See 2.4). These skills, however, must reside within the human actors in the organisation or those taking part in the process of enactment. Skilled actors then influence the process of enactment in three ways: they make better assessments of the current environment (Weick 1988; Perrow 1984); they allow the development of different routines or schemas (Orlikowski 2000; Weick 1998); and they are better able to drive the process of sensemaking which is essential to voluntary, coordinated action (Weick, Sutcliffe & Obstfeld 2005; Swanson & Ramiller 1997).

3.1.3.1 Perception and Assessment

From crisis literature, it has been observed that people with a higher capacity to act, with a greater variety of responses (more highly skilled) are able to see more events (Weick 1988, p.311):

“...people see events they feel they have the capacity to do something about. If people think they can do lots of things, they can pay attention to a wider variety of inputs because whatever they see, they will have some way to cope with it.... Accuracy in perception comes from an expanded response capacity.”

By the same token, specialized experts in a narrow field may only pay attention to those phenomena to which they believe they are capable of responding. This may restrict them from understanding wider implications or developing a holistic view of the evolving situation (Perrow 1984).

Agents with the appropriate skills are more likely to develop an accurate understanding of the current environment, which is a pre-requisite to useful action. It is not uncommon for ‘crises’ such as huge crowds of dissatisfied customers to follow initial deployments of ICT systems (Chan et al. 2011) due to technical or process failures. Skilled agents are more likely to make accurate assessments of the situation, and to develop appropriate responses.

3.1.3.2 Performance and Improvisation

Feldman describes a routine as a “repetitive, recognizable pattern of interdependent actions involving multiple actors” (Feldman & Pentland 2003, p. 96). Interdependence arises when “one person’s actions constitute the necessary means for other people’s actions to be successfully completed” (Deken et al. 2016, p.661). For example, whether or not a cashier would be able to make change for a purchase may depend on whether sufficient small bills are in the till. This in turn depends on the person who removed the previous day’s takings from the till — who might be another cashier, or the business owner.

Routines are best understood in two parts: an ostensive aspect which shapes perception of what a routine might be, and a performative aspect which is the enactment of the routine by a specific agent, in a specific place and at a specific time (Feldman & Pentland 2003). The ostensive aspect encompasses descriptions like standard operating procedures, as well as the diverse interpretations by the various actors involved in the procedure. This constitutes part of the structure of the organisation. However, each performance of the routine also has to be adapted to the context at the specific place and point in time (ibid.). Even when routines are embedded in technology, large amounts of variation can still exist (Pentland, Hærem & Hillison 2011). Thus the performative aspect is inherently improvisational, since while there are rules and expectations, there is always the possibility of adapting or resisting them. This paradox where each performance is unique, but still considered ‘the same’ was described as the “paradox of a (n)ever changing world” (Birnholtz, Cohen & Hoch 2007, p.316).

Skills and competencies affect the performance of routines in two ways. In the first instance, skills affect the individual actor’s ability to perform the routines in conformance with, or in close approximation to, the ostensive aspect of the routine. For example, whether or not a cashier gives the correct change may depend on his ability to add or subtract, or to operate the till correctly.

In the second instance, skills and competencies affect the individual actor’s ability to adapt routines to suit current circumstances. Improvisation is not uncommon, and often occurs in public sector organisations (Weick 1998; Brower & Abolafia 1996; Carr & Brower 2000). Government officers will use experience, judgement and intuition to develop responses to issues at hand. Improvisation include modifying actions with current participants, extending current actions to new participants, or creating entirely new routines without drawing on existing routines (Deken et al. 2016). Changes to routines often happen when there is a crisis, when an organisation is first established, or in areas which are new and ambiguous (Feldman & Pentland

2003). The introduction of technology is also one such occasion when changes to routines might occur (Barley 1986).

In changing routines, skilled agents allow for different schemas and routines to be enacted. For example, a case study by Feldman (Feldman 2004) examined events in a residence hall for students. In the case, building directors who did not live in the halls were responsible for student staff members who were residents. In one year, an instance of suspected bulimia was discovered by a building director. She subsequently alerted and provided information to all the staff, and held meetings so that all staff members could be informed and could provide necessary support. Subsequent changes to the hiring process created resident staff members who specialized in different areas such as eating disorders, drug and alcohol abuse, and sexual assault, amongst others. After the changes, when a subsequent instance of suspected bulimia was detected, the specialist staff member provided advice directly with assistance from external experts. Other staff members, while aware of the incident, were less involved.

In the use of a tool for collaborative technology, members of the technology staff in a large organisation who were deeply skilled in the use of the tool were able to enact a collective problem-solving technology-in-practice (Orlikowski 2000). They used the tool for cooperative troubleshooting, sharing of technical knowledge, and enhanced the tool by created additional knowledge sharing components such as databases and templates. In contrast, another group of consultants within the same firm were less skilled in using the tool, and only used limited features such as email. Amongst other reasons such as institutional norms, the lack of end-user skills in using the tool contributed to more limited outcomes.

In a third study by Robey and Sahay (Robey & Sahay 1996), two implementations of a geographic information system in two different counties were compared (GIS). In one implementation, geographers skilled with conceptual knowledge in geo-spatial mapping led the spread of knowledge and education amongst potential users. More than half the users also had prior experience with spatial mapping programs. This allowed the training of users focus on accomplishing job-related tasks, and creating routines around how those tasks might be accomplished with GIS. In contrast, the enactment process in other implementation was led by computer specialists who did not have in-depth knowledge of the subject matter. The focus on training was then on procedures, and on the features of the GIS. In the state of implementation at the time of the study, the first county reported transformative effects, improved communications and new routines associated with distributed ownership of the GIS. In the second county, implementation was slow and of little consequence for users.

Just as a skilled musician may create multiple improvisations over multiple performances (Weick 1998), skilled agents, with a wider repertoire of responses and past experiences to draw from, are able to perform routines with a wider variety of improvisations appropriate to the situations at hand.

Beyond routines, human agents also modify structures by determining their job roles, or negotiating new social contracts around their jobs (Nicholson 1984). They may modify their jobs through the shaping of task boundaries, relationship boundaries or cognitive perception of the job (Wrzesniewski & Dutton 2001). The motivation for such modification and crafting of job roles include asserting control over their jobs, creating a positive self-image, and connecting with others (ibid.). Skilled agents may shape job boundaries differently from unskilled agents, since their skills would allow them greater control over a wider variety of tasks, or allow them to develop other resources like networks of relationships.

Skills and competencies affect the performance of routines by allowing actors to perform routines in conformance with the ostensive aspect of routines, and by allowing the creation of a wider variety of novel routines or job roles.

3.1.3.3 Sensemaking and Mobilisation

Sensemaking occurs when organisation circumstances turn into words and categories. It is part of organising, which is embodied in written and spoken texts. Reading, writing, conversing and editing are crucial actions. This process of discussion and communication is a central component of sensemaking and organising, and the process through which the behaviour of actors in an organisation is shaped (Weick, Sutcliffe & Obstfeld 2005). It is necessary for a voluntary, coordinated system of action (ibid.).

Such sensemaking is also part of organising for technology implementation. The development of an organising vision, through which an organisation develops the rationale for the technology innovation, is a crucial step in the process (Swanson & Ramiller 1997). It describes the innovation, how it works, what the benefits are, and the changes that are needed by the organisation and what the organisation might look like when the innovation is implemented (ibid.). It provides a common context through which the innovation can be interpreted and legitimacy for the innovation by siting it within the broader business context (ibid.).

In addition to the broader vision, the project structures also need to be organised (Weick 2001, p. 216). The organisation has to make sense of the many detailed choices required during

implementation — the “know-when” and “know-how”. Beyond project objectives, staff roles and designations, tasks, schedules, allocation of organisational funds all need to be documented and communicated to create the project organisation (Swanson & Ramiller 2004).

Beyond the technical implementation, the transformation of organisational routines also requires sensemaking. In order to obtain the full benefits of ICT implementation, organisational routines and relationships may need to be significantly transformed (Davenport 1993a; Venkatraman 1994). As organisational routines are often carried out by multiple actors (Feldman & Pentland 2003), inventing or modifying a routine in the process of technology enactment would then require coordination among these actors. Therefore, a shared understanding of the appropriateness of the new or modified routine is necessary (Deken et al. 2016; Jensen, Kjærgaard & Svejvig 2009; Dittrich, Guérard & Seidl 2016). Sensemaking would then be a necessary step to mobilise and coordinate these actions.

That sensemaking is necessary for transformative enactments of technology is hinted at by the case studies discussed in the previous section. In the pair of cases on GIS implementation discussed in Section 3.1.3.2, the enactment that was more transformative on the organisation was preceded by the creation of a 72-page document detailing selection criteria and functionality of the new technology, and by the creation of a business case by consultants (Robey & Sahay 1996). The creation of these documents would have involved the distillation of organisational circumstances into words, and some amount for conversation. These artefacts and their interpretations would also constitute elements of the organising vision and provide legitimacy for the changes. In the contrasting case, these artefacts and structures were not created.

In a case that examined the implementation of a system to allow the electronic filing of tax documents, an e-Government Action Plan was used as one motivation for transformation. An end-state operating model for the tax authority was also developed and communicated to various stakeholders (Chan et al. 2011). Conversations were held with both potential users of the system outside the tax organisation as well as employees.

The general management competencies necessary for such sensemaking in technology enactment have long been identified in IS literature (See Section 2.4.1). They include strategic planning, organisational design and transformation (including communication), and process design and management. The process of sensemaking is crucial for e-Government implementation. Skilled actors able to facilitate the process of sensemaking would enable transformative technology enactment.

3.1.3.4 Summary of Skilled Actors in Enactment

Human agents are creative and play a significant role in technology enactment, and in enacting organisational structures and routines (Weick 1998; Feldman & Pentland 2003; Boudreau & Robey 2005). Skilled actors can influence the outcomes of enactment because they are likely to make more accurate assessments of the situation (Weick 1988), allow for different routines and schemas to be enacted (Feldman 2004; Orlikowski 2000; Robey & Sahay 1996), and can facilitate sensemaking necessary for organising and coordinating action (Weick, Sutcliffe & Obstfeld 2005).

The Technology Enactment Framework does not explicitly account for these effects, and this study will attempt to close that gap. In the next section, we discuss another possible gap, the dimension of time. While enactment is a process that occurs over a period of time, the Framework is static, and implies that the factors influencing enactment outcomes do so without variation through the course of enactment. This may not be the case, as there is a sequence to the various activities which are carried out by different actors.

3.1.4 The Process of Technology Enactment and Implementation

Technology enactment is generally treated as on-going, continuous process with an indeterminate end-point, or no end-point at all through the lifetime of the organisation (Fountain 2001). In addition to the objective technology, it also focuses on the social context, and the social constructions that give meaning to the objective technology (Weick 1988; Orlikowski 2000).

To understand the process of technology enactment, five publications were examined which described the process by breaking them down into different stages. These included those that draw more heavily on the systems development tradition (Royce 1970; Heeks 2006), one which draws on institutional theory (Swanson & Ramiller 2004), and two cases studies which discuss the enactment process in real-world situations (Robey & Sahay 1996; Chan et al. 2011). The aim of adopting such an approach is to derive a model that encompasses views from both information systems and institutional theory.

Technology implementation or e-Government implementation, is sometimes treated as a linear process (Royce 1970) or as a cycle, where the end of one ICT system's implementation would lead, over a period of time, to planning for and implementing a subsequent ICT system (Heeks 2006). It tends to focus on reifying the objective technology and its associated artefacts.

In order to study the impact of skills and competencies over the course of technology enactment, suitable start- and end-points of the period to be studied must first be defined. The activities that are carried out as part of the enactment process also need to be understood. Different actors in the organisation are involved in these activities and influence the process of enactment in different ways. This section examines the activities as described in the IS and e-Government literature, and those from institutional theory. A summary of these activities can be found [Table 3](#).

In the early years of information systems development, Winston Royce wrote a paper on managing the development of large software systems (Royce 1970). In it, he described the sequential steps of gathering systems and software requirements, analysis, program design, coding, testing and usage in the process of systems implementation. This subsequently evolved into the “waterfall” model of software development which formed the underpinnings of large systems development. Other methods of software development, most notably agile methods (Larman & Basili 2003), have been used since then but Royce’s model remains relevant in many contexts.

More recently, from the e-Government literature, Heeks (Heeks 2006) describes e-Government systems development as a lifecycle involving five stages. In *project assessment*, projects are identified and assessed for their suitability. In the *analysis of current reality*, descriptions and analysis are created of the objectives and values, information, processes, skills and other dimensions of the organisation. In the *design of the proposed new system*, objectives for the new system are set, descriptions of the future state of the organisation and options for the new system are created. This is followed by system construction, where technology is acquired, detailed design decisions are made, and the system is built and tested. Finally, in *implementation and beyond*, users are trained, data is converted into new formats, and the systems is monitored for performance and maintained as necessary.

The Process of Technology Enactment	Royce (1970)	Heeks (2006)	Swanson and Ramiller (2004)	Robey and Sahay (1996)	Chan et. al. (2011)
Formation		Project Assessment -Identifying possible projects and basic project parameters -Assessing whether to proceed Analysis of current reality -descriptions and analysis of objectives and values, information, processes, skills and other dimensions of the organisation Design of the proposed new situation -Objectives of new system -Options for new systems	Comprehension – sensemaking; does this innovation apply to us? Adoption – supportive rationale; feasibility studies, business case; creation of organisation specific rationale	Initiation -Problem identification and building of business case -Positioning as an organisation wide effort -Establishment of criteria for new system	Planning phase -Establishing of objectives and end-state (e.g. closing of counter services) -Gathering inputs from key users
Development	Development -Gathering systems and software requirements -Analysis -Program Design -Coding -Testing	Systems Construction -Technology acquisition -Detailed design -Building and testing Implementation and Beyond -User training -Data conversion	Implementation -detailed choices; objective technology, timing, resources and readiness	Transition -Enabling end-users to with specific skills to operation system Deployment -implementation of systems -Assignment of responsibilities	Developing phase -Procurement Process -Vendor to develop understanding of features and requirements -Change communication (internal and external) Testing
Operations	Usage	Implementation and Beyond -Performance monitoring -Systems maintenance	Assimilation – absorption in to organisation worklife; new routines adopted	Spread of Knowledge -Cultivation and spread of job specific conceptual knowledge, topology, geo-referencing and geo-coding -procedural and operational knowledge	Operating Phase -Crisis Management -Troubleshooting

Table 3 Activities in e-Government Implementation

The activities described by Royce and Heeks are part of the process of enactment in that they are necessary to create the real objects in the enacted environment (Orlikowski & Barley 2001). However, the enactment of e-Government systems goes beyond the development and use of software and ICT infrastructure (ibid.). It also involves the social processes that create significance and meaning attached to these objects. In describing ICT innovation, Swanson and Ramiller (Swanson & Ramiller 2004) draw on institutional theory and describe four processes that occur within organisations. The first involves *comprehension* of the new innovation – sensemaking of the innovation, and an assessment of its applicability to the organisation. The second occurs to support a decision for *adoption* – siting the innovation in the context of organisation specific business problems, perhaps through feasibility studies or business cases. During *implementation*, detailed decisions need to be taken surrounding the choice of technology, the timing of implementation and the allocation of organisational resources in support of the change. Finally, in the *assimilation* phase, new routines are adopted, and the technology innovation is absorbed into the organisation's worklife.

Case studies from e-Government literature illustrate how activities reifying of the objective technology and the social processes associated with enactment go hand-in-hand in technology enactment. In a pair of case studies by Robey and Sahay (Robey & Sahay 1996), the authors identified four processes related to the implementation of a new Geographical Information System by the government agencies in two counties. Activities during *initiation* included building a common understanding of the problem, a business case, and establishing criteria and desired functionality of the new system. This process of initiation and sensemaking is necessary for collective action (Weick, Sutcliffe & Obstfeld 2005). Other activities, during *transition*, involved capacity building – enabling end-users with specific skills to operate the system, including procedural and operational knowledge. In one case, specific attention was paid to the *spread of knowledge* in job specific areas such as topology, geo-referencing and geo-coding. In one case, implementation included the physical *deployment* of the new system components to multiple sites. New job responsibilities were also assigned to various actors in association with the new routines created. While the sequence of all these activities was not explicitly described, it was clear that the initiation tasks of building a common understanding and business case was carried out first.

In another case, Chan et al. (Chan et al. 2011) described the implementation of a new ICT system for a tax authority. The process of technology enactment was described in three phases: planning, developing, and operating. In the *planning* phase, objectives for the system were set by senior managers. This included a vision of future operations such as the closure of counter services. Expectations of anticipated key users of the new system, which were

businesses outside the tax authority was obtained. In the *developing* phase, a tender was called and a vendor appointed. A detailed analysis of system requirements was conducted, with the appointed vendor having to understand the requirements in a short period of time. Affected employees such as counter service staff were engaged and attempts were made to address their concerns. External users of the system were also informed of impending changes. Testing was done by end-users. When the systems was finally put to use in the *operating* phase, significant management attention was devoted to crisis management – long queues formed as taxpayers struggled to use the new system. Technical faults also developed, and had to be rectified. Processes were eventually modified, and counter services were reopened to assist taxpayers.

Based on the foregoing examples and frameworks, it can be seen that enacting e-Government implementation involves a sequence of activities and processes. Different actors are involved in different activities at different points in time. For example, vendors of technology are typically involved in implementation activities only after the decision has been made to adopt the technology.

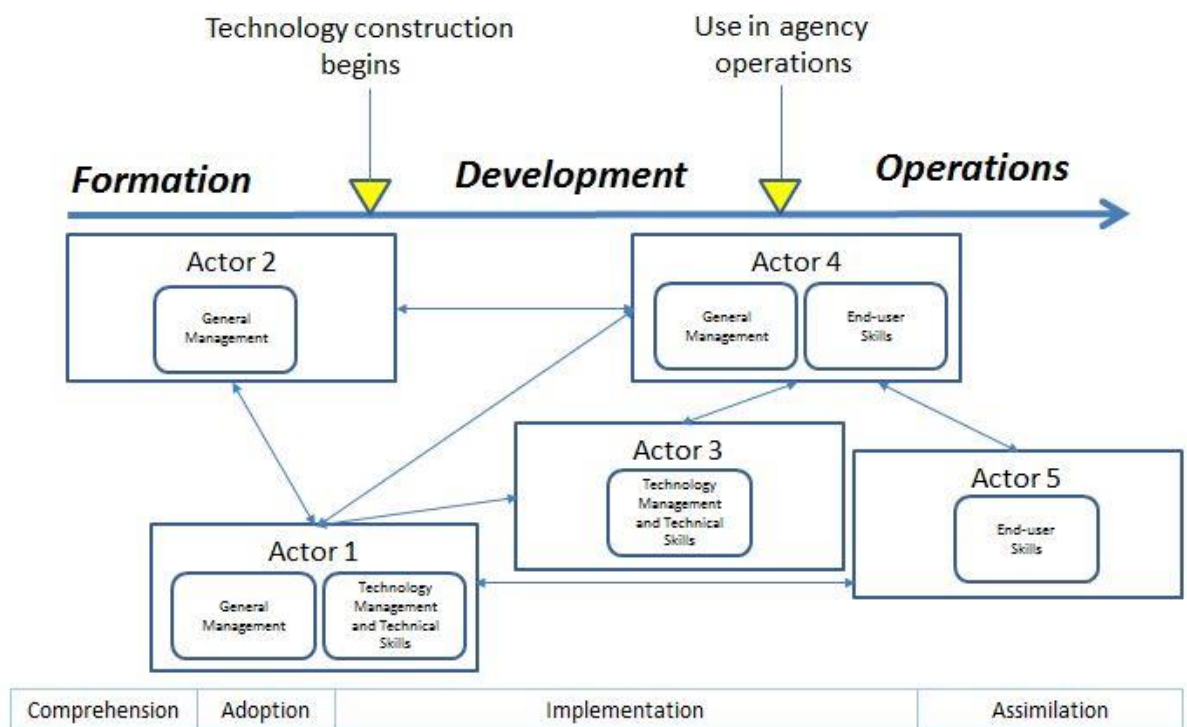


Figure 5 Process of Enacting e-Government Implementation over Time

In order to better understand how skills and competencies play a role in technology enactment over time, the period of study must first be defined. For the purposes of this study, we will examine the process from the time projects are identified and assessed for their applicability to the organisation (Heeks 2006; Swanson & Ramiller 2004) to the time when new

ICT-enabled routines are first incorporated into the worklife of the organisation (Swanson & Ramiller 2004; Chan et al. 2011; Robey & Sahay 1996). This time period corresponds to time periods commonly used in case studies of e-Government implementation (Chan et al. 2011; Robey & Sahay 1996). Because of the different stakeholders involved, and because of the different skill-sets that are likely to come into play, this period is further divided into the Formation Phase, when the organisation identifies and assesses projects; the Development Phase, when the technology is acquired and constructed; and the Operations Phase, when the technology is put to use and incorporated into the worklife of the organisation. The process of enacting e-Government implementation can then be understood as the interaction amongst variously skilled actors in the performance of the activities necessary for e-Government implementation (See **Figure 5**).

In order to assess the impact of skills and competencies on enacted e-Government implementation, the outcomes of implementation (or attempts at implementation) must first be differentiated. The next section examines different ways of measuring implementation outcomes.

3.2 Measuring enacted e-Government Implementation

One of the challenges in understanding e-Government is how to define success, or perhaps how to measure the maturity of implementation in any country, or government agency. Stage models discussed in section 3.1 are best used in examining web based interfaces. There has been no consistent way to measure success for implementations that extend beyond the web interface. Sometimes success is measured on the basis of projects (Thomas 2008; Petter, Delone & McLean 2008), at times at the level of the agency or institution (Dawes 1996), or at times at different points in the lifetime of an ICT system (H. Al-Yaseen 2008).

Sometimes a mix of hard and soft measures is used (Gupta & Jana 2003), including return on investment, total costs and revenues, improvement in planning and control, quality and value of decisions and information, and the operating parameters of the system in use. One approach to assessing outcomes of e-Government implementation is in terms of failure. Heeks (Heeks 2002) classifies “total failure” as the non-implementation or abandonment of the project, “partial failure” when major goals are not achieved, or major negative consequences result, and “success” as a state where major goals were achieved without substantial negative consequences.

Throughout the alternative assessments of e-Government implementation, common themes emerge which can be mapped against the two categories of goals and expected benefits for e-Government: management efficiency, and government transparency.

3.2.1 Measures of Efficiency and Effectiveness

The simplest benefit to identify is the reduction of costs: reduction of duplicate data collection, paperwork and data processing (Edelman 1981; Moon 2002). Commonly associated with this is an improvement in service quality in terms of responsiveness, service transaction volumes and processing times (Foley 2009). Agencies with homogeneous customer groups, definable tasks and measurable outcomes are most likely to benefit in this fashion (Buckley 2003). Profitability and revenues have been used in many studies on ICT adoption (DeLone & McLean 1992; Gupta & Jana 2003), but this is less relevant to the public sector.

In order to obtain these benefits, however, “most organisations require transformations of their internal rules, channels of communications, hierarchical structures, and business processes” (Gil-Garcia 2012 p.22). While ICT implementation may not necessarily result in institutional change, institutional changes can result - when the implementation gives rise to “the adjustment of the whole set of technological, managerial, and political variables affected by ICTs implementation” (Gascó 2003, p. 13). In some cases changes may only be incremental in nature (Weerakkody & Dhillon 2008); however, they may also result in organisational benefits like more organised and integrated business processes, increased collaboration among partners leading to better coordination (Gil-Garcia, Soon Ae & Janssen 2009; Dawes 1996; Foley 2009).

Besides organisational benefits which are perhaps outcomes for the government agency, there are also technical measures mostly focused on the outcomes of a system or website implementation. These include measures such as functionality, reliability, use and usability, accessibility, and user satisfaction (Petter, DeLone & McLean 2008; Bertot & Jaeger 2006; Danziger & Kraemer 1985; Kling 1993). Attributes such as system quality, information quality, use, user satisfaction, and the eventual impact on the individual are intermediate measures to the impact on the organisation (DeLone & McLean 1992). These should also be considered as success measures, “because they are the basis of other more substantive results” (Gil-Garcia 2012 p.23).

At the macro level, success or failure can also be understood along a continuum (See **Table 4**). In analyzing developing countries’ e-Government initiatives, success may mean the achievement of stakeholders’ major goals without significant undesirable outcomes, but partial

failures may occur if only a subset of such goals are achieved, or if goals are only achieved for a limited period of time (Heeks 2002).

	Definition
Success	Most stakeholder groups attain their major goals without significant undesirable outcomes.
Partial Failure	Major goals not attained; or significant undesirable outcomes; or system abandoned after a short time.
Total Failure	Not implemented; or immediately abandoned after implementation

Table 4 Definitions of implementation success (Heeks 2002)

As discussed above, outcome measures in terms of service quality, responsiveness, costs of service provision, increased collaboration, as well as the intermediate measures of system quality, use and usability would be useful in measuring the success of enacted e-Government implementation. Based on these measures, there has been some evidence of success with many municipal governments providing greater availability of services through new channels, and reporting greater overall efficiency (Moon 2002; Moon & Norris 2005; OECD 2003; Krishna 2005). In a well-cited case, the Inland Revenue Authority of Singapore was able to move its tax filing online and improve its customer satisfaction and operational efficiency (Tan & Pan 2003).

3.2.2 Political Measures

Accountability in government is often seen as an end in itself (Koppell 2005), or as a means towards good governance (Kossick 2002; Karunasena & Deng 2012). Government officials need to be able to explain the decision-making process, provide information on the policy developed, and the eventual outcomes of that policy (Heald 2006). This transparency is the fundamental basis for accountability.

One model of transparency uses the Website Attribute Evaluation System (WAES) (Demchak 2000), which, amongst other things, examines ownership of the websites, the availability of information on contacts, the organisation and associated issues, and the interactivity of the websites. Some studies using this model have shown that government openness has led to administrative effectiveness (LaPorte 2005), while others suggest that transparency may actually have a negative effect on the perceived competence and honesty of government (Grimmelikhuijsen 2010).

The other political outcome deemed as desirable is the increase in participation of citizens in the political process (Cullen & Sommer 2011). ICT tools have been created to try to present an unbiased view of the policy positions of candidates in an election (Ramonaite 2010). While

such tools reduce the electoral costs for voters, they may not lead to better governance if voters do not have coherent attitudes on various political issues.

Beyond elections, however, citizens can also be more involved in policy-making by presenting multiple views and feedback, and interacting with the government early in the policy development process (Jaeger 2005; Wojtczak & Morner 2015). Regulations requiring the sharing of information electronically can facilitate this process, while also increasing transparency (Cerrillo-i-Martínez 2011; Lemieux et al. 2015). The decreased cost of communications due to ICT, allows this to happen more easily (Anderson et al. 1995).

As can be seen, there have been some attempts to develop metrics to measure e-Government impact on accountability and participation. However, Wong and Welch note that accountability appears to be a function of the nature of nations and their bureaucracy rather than technology (Wong & Welch 2004). They note that technology and globalization seem to drive an overall increase in accountability, but causes a greater divergence in accountability. That is, agencies and nations which already behave in a highly accountable manner will increase their transparency and accountability relative to those which are currently less accountable.

The evidence, therefore, remains mixed as to whether e-Government leads to greater accountability and citizen participation.

3.2.3 Summary of Measures

In order to measure the impact of skills and competencies on e-Government implementation, implementation outcomes must first be differentiated.

Measures of efficiency and effectiveness, such as the reduction of costs, improved processing times as well as intermediate measures including systems functionality, reliability and sustained usage are useful in differentiating implementation outcomes. Implementation outcomes can also be differentiated by assessing the extent to which stakeholders attain their goals and whether or not there were undesirable outcomes.

Political measures such as citizen participation in policy making and government openness in disclosing information might also be useful in measuring e-Government implementation outcomes. However, these measures may also be affected by other factors such as the nature of the countries and their bureaucracies under investigation.

This study focuses primarily on efficiency and effectiveness, and will use those measures to differentiate implementation outcomes. The next section will discuss the a priori theoretical lens, and its relationship with the research questions.

3.3 The Theoretical Lens

The Technology Enactment Framework provides a useful lens through which the process of technology adoption in developing countries may be examined. Gil-Garcia (Gil-Garcia 2012) has proposed refinements in Enacting Electronic Government Success which includes environmental factors beyond the institutions. Both Fountain's Technology Enactment Framework and Gil-Garcia's refinements pay particular attention to the interaction between the institutional arrangements, organisational forms and technology. The focus on institutional arrangements is particularly useful in studying government organisations, since many are constituted through laws and regulations. Both have also drawn results from qualitative, and, in the case of Gil-Garcia's framework, quantitative data from government organisations. Gil-Garcia attempts to account for political, social and economic factors in the larger context beyond the institution. These are often cited as potential barriers to implementation in developing countries (See Section 2.3). Hence, it was decided that Gil-Garcia's refinements should be included in the theoretical lens. A brief description of Gil-Garcia's framework (See **Figure 6**) is given below.

As with other integrative theoretical approaches, enacting e-Government success involves a series of embedded, recursive, causal relationships. The bi-directional arrows depict this complexity.

The Technology Enactment Framework forms the foundation of Gil-Garcia's work, and so he adopts many elements and definitions from it. Gil-Garcia defines e-Government success in terms of the enacted technology and its impact — in terms of organisational outputs and outcomes — such as efficiency, effectiveness, greater service quality, or transparency. For the purposes of this study, outcome measures in terms of service quality, responsiveness, costs of service provision, increased collaboration, as well as the intermediate measures of system quality, use and usability would be used in measuring e-Government implementation.

The environment produces both opportunities and constraints, which may directly impact the enacted technology, or after intervention by management, produce a different outcome (Kraemer 1989). The resulting outcome may then modify management strategies, and eventually the organisational structures, and even the institutional arrangements. Gil-Garcia describes the environmental factors as including "political conditions, economic conditions, demographic conditions and ecological considerations" (Gil-Garcia 2012, p.54) and posits that these have both a direct impact on e-Government success, and an indirect impact through their influence on organisational forms and institutional arrangements. Environmental factors are particularly important in developing countries, since they are more likely to face specific challenges like lack of funding (Edmiston 2003; Jaeger 2003; Gebremichael & Jackson 2006;

Mukabeta Maumbe, Owei & Alexander 2008); lack of political stability (Sahay & Avgerou 2002); competing developmental priorities (Basu 2004); and lack of infrastructure (Siddiquee 2008; Littlejohns, Wyatt & Garvican 2003).

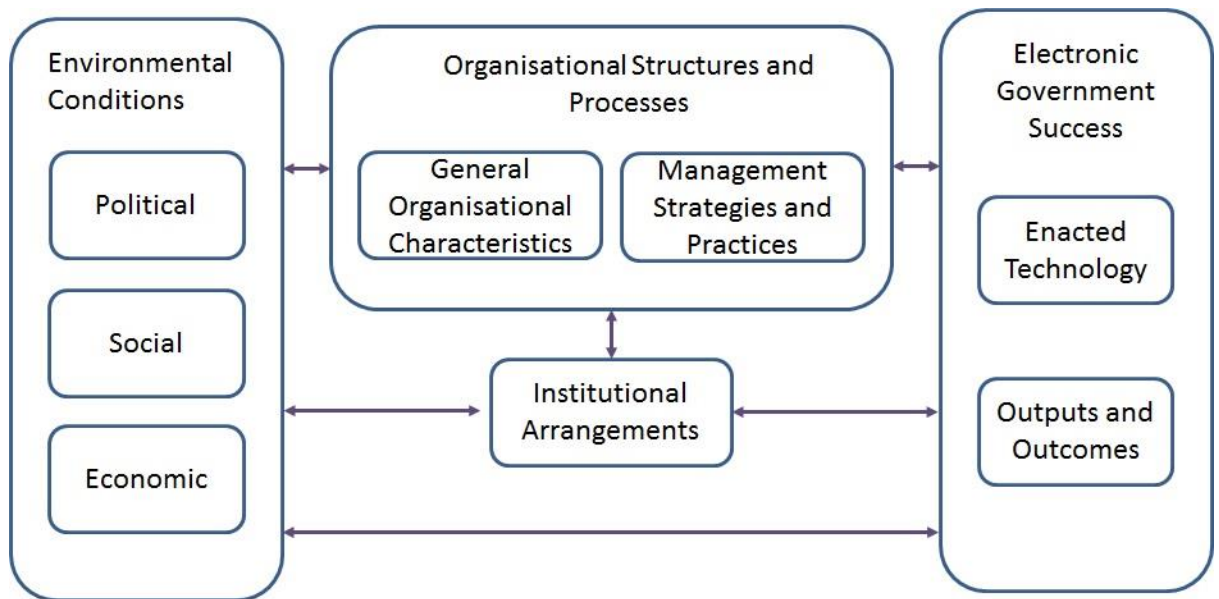


Figure 6 Enacting e-Government Success

Within the Technology Enactment Framework (Fountain 2001), organisational structures, work processes have a direct impact on the enacted technology. Institutional arrangements also have an indirect impact on enacted technology through its influence on organisational forms. However, Gil-Garcia cites Kraemer (Kraemer 1989) in suggesting that institutional arrangements have a direct impact on e-Government success. He also notes that “there is a dynamic interaction between enacted technology, outputs and organisational structures and processes” (Gil-Garcia 2012, p.55) and information technologies will also affect organisational structures and processes, as well as the institutional arrangements.

While institutional theory posits that individual actors are constrained in their actions by the organisational forms and institutional arrangements, several authors suggest that the skills and ability of the actors also affect the outcomes (Kalu 2007; Chou, Chen & Pu 2008; Arseneault 2005; Schuppan 2010) (See Section 2.4). Skilled agents also facilitate implementation success through better assessments of their current situations (Weick 1988); their wider repertoire of responses (Weick 1998; Feldman 2004); and through their ability to mobilise and coordinate action by making sense of complex environments (Weick, Sutcliffe & Obstfeld 2005).

In this respect, the enacting e-Government success framework only examines the skills and abilities of actors as part of the management strategies and practices of the IT department, and perhaps as part of the enacted technology. Human resource practices were examined as

part of the institutional arrangements and deal primarily with hiring, reward and retention, with little focus on development and expansion of skills.

Using the Technology Enactment Framework with Gil-Garcia's refinements in its present form may lead to a possible gap in understanding of how skills and competencies, or the lack thereof, may affect e-Government success.

3.3.1 The Role of Individual Skills and Competencies in the Process of Enactment

As discussed in Section 2.4, skills and competencies of the workers also constitute the technology within the organisation. Three categories of skills and competencies: general management, technology management and end-user skills and competencies are proposed.

To a large extent, these skills must reside in actors within the government agencies, or within the service providers under their management. This suggests that it would be useful to add a refinement to the Technology Enactment Framework — a construct specifically representing these skills and competencies (See Sections 2.4 and 3.1.3). Other skills such as general education and literacy skills in the general population, identified by Arseneault (Arseneault 2005), would be treated as environmental factors within which the government and its agencies operate.

Figure 7 illustrates the *a priori* theoretical model used in the study, encompassing the national level barriers discussed in Section 2.3.1 (F1), the organisational barriers identified in Section 2.3.2 (F2 and F3), and the actors' skills and competencies (F4) described in Section 2.4 and their possible impacts (Section 3.2.1) (D). This model also incorporates ideas around human agency and how they might influence enactment as discussed in Section 3.1.3 (F4, shaded).

In addition, in order to study the impact of skills in enactment as a process, the model is supplemented by a second dimension (See **Figure 8**) which accounts for the different activities that happen at different points in time, and the different stakeholders involved in these activities. This second dimension defines as the period of study the time from which projects are identified and assessed for their applicability to the organisation (Heeks 2006; Swanson & Ramiller 2004) to the time when new ICT-enabled routines are first incorporated into the worklife of the organisation (Swanson & Ramiller 2004; Chan et al. 2011; Robey & Sahay 1996). It incorporates activities from e-Government implementation (Heeks 2006), and enactment processes from institutional theory (Swanson & Ramiller 2004). This period is further divided by two points into the Formation Phase, before technology construction begins; the Development Phase, when the

technology is acquired and constructed but before it is put to use; and the Operations Phase, when the technology is put to use and incorporated into the work life of the organisation.

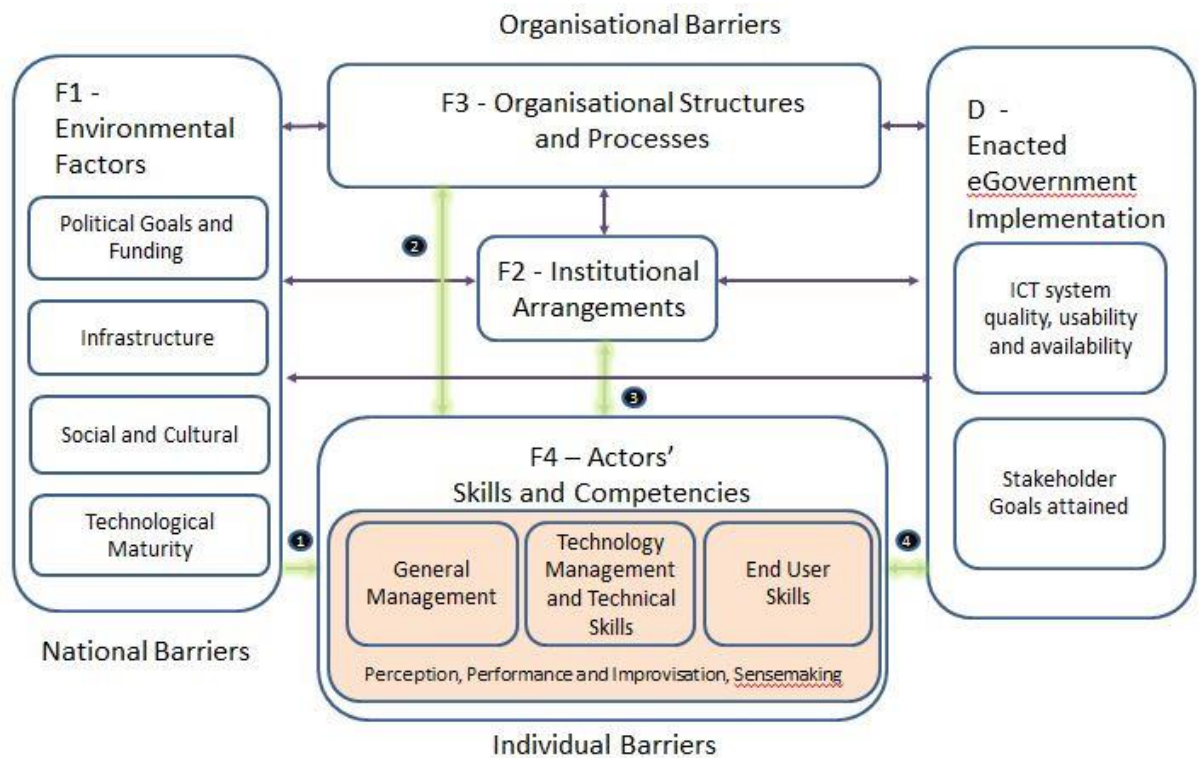


Figure 7 Actors' Skills and Competencies in Enacted e-Government Implementation

The *a priori* model and its supplement incorporate ideas from the literature which draws evidence from both developed and developing countries alike. It is not restricted to developing countries. However, developing countries are likely to benefit significantly from e-Government implementation, and so the model will be applied to developing countries in the context of this study.

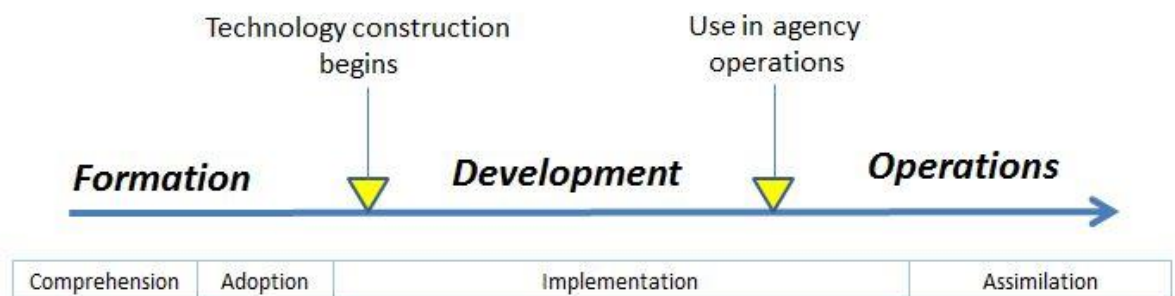


Figure 8 Process Dimension in Enacting e-Government Implementation

The key research questions would then be as follows:

- 1) a) How do skills and competencies (F4) affect the enacted e-Government implementation (D) in developing countries? And b) How do Environmental Factors (F1), Institutional Arrangements (F2), and Organisational Structures and Processes (F3) influence skills and competencies (F4) in developing countries?
- 2) How do skilled actors influence e-Government implementation outcomes through perception, performance and improvisation, and sensemaking?
- 3) Which skills and competencies become important at different points of the enactment process?

The first question explores the new skills and competencies construct in relation to the Technology Enactment Framework and Gil-Garcia's refinements. Question 1)a) explores how general management competencies, technology management competencies and technical skills, and end-user skills and competencies affect e-Government implementation outcomes (relationship 4). Question 1)b) explores how the national and institutional contexts influence skills and competencies in developing countries (relationships 1 to 3).

The second question explores how skilled actors may influence the outcomes of e-Government implementation through perception, performance and improvisation, and sensemaking. Because different problems will occur as different activities are carried out in the process of enactment, skilled actors may influence the outcomes and "solutions" to these problems in different ways throughout the process. This question, therefore, also explores the influence of skilled actors in the context of the Formation, Development and Operations Phases of the process.

The third question examines skills and competencies of the skilled actors in the context of the activities that takes place over time as part of the process of enactment. Different stakeholders and actors are involved in the different activities the Formation, Development and Operations Phases. Would different skills and competencies, already identified in the IS literature, become important in each of these phases? If so, what might they be?

3.4 Summary of the Development of the Theoretical Lens

A review of e-Government theory found that stage models, which measure the maturity of e-Government implementation, are useful for benchmarking. However, they do not explain how one might move from one stage to another, or why any government agency might be in a particular stage. The Technology Enactment Framework, which focuses on the process of

technology adoption within the context of an institution or organisation, possesses greater explanatory power. The Framework accounts for important phenomena in the process of enacting technology: the selective use of technology by human actors; organisational change that may be triggered by the introduction of technology; and the institutional and organisational impact on human actors, which then shape the eventual form of the technology. Its focus on the institution is particularly relevant in e-Government, where many implementations are in the context of institutions set up through laws and regulations.

The Technology Enactment Framework and its refinements do not, however, explicitly account for skills and competencies in the process of enactment. Skilled actors may influence the outcomes of e-Government implementation by more accurately perceiving their current environment, performing appropriate novel actions, and mobilising coordinated action necessary for organisational transformation. The Framework also does not account for the sequence of activities and the variety of skilled actors in the process of enactment. An *a priori* model was developed to account for actors' skills and competencies in the process of enactment.

The following Chapter discusses the methods used in conducting the study.

Chapter 4 Methodology

The purpose of this study is to explore the roles that skills and competencies play in the process of e-Government implementation. In examining the roles that skills and competencies play, the study will also explore if and how such skills and competencies are developed and retained through the process of implementation. This chapter describes the methodology used to investigate these questions.

The Technology Enactment Framework and refinements by Gil-Garcia (See 3.3), and the literature on skills and competencies, provide the five *a priori* constructs that guide the research design. These constructs comprise the four established by Gil-Garcia: environmental factors, institutional arrangements, organisational structures and processes, and electronic government success; and a new construct: actors' skills and competencies. Section 3.3.1 (See [Figure 7](#)) provides a sketch of the *a priori* theory that guides the research. As the study also investigates a theoretical extension with a new construct, an exploratory approach is appropriate.

Interactions between the constructs described above are multiple and complex. There are also multiple stakeholders and institutions involved in the development, retention and deployment of skilled personnel in government. In order to capture the complexity of these interactions and the surrounding context, and because the study is seeking explanations for particular outcomes, a case study approach was chosen (Yin 2009, p. 18).

Data from government administrations in five developing countries were examined. The Technology Enactment Framework was developed in the context of a developed economy. However, developing countries hold a significant potential to benefit from e-Government implementation, as many of their administrations are still largely paper-based (Qian & Aquaro 2014). Institutions in developing countries are likely to be significantly different from those in advanced economies, and implementations in developing countries are also affected by larger national, environmental and social contexts (Heeks 2002; Avgerou 2008). Because of these differences, studies in developing countries may reveal new insights about the process of technology enactment.

The unit of analysis was government administrations, with government agencies implementing e-Government systems, and their interactions with centralised human resources or IT agencies, as embedded units of analysis. The interactions with centralised human resources or IT agencies were included because they are likely to have an influence on how skilled personnel are allocated, and how they are developed.

Five cases out of 17 candidate countries were chosen primarily on the basis of whether investigators had an on-going or recently completed e-Government implementation, and whether investigators had sufficient access to the appropriate government officials based on the intended unit of analysis. Cases selected were representative of developing countries, but also captured the polar ends of the spectrum of developing countries. This allowed for theoretical replication (Yin 2009, p. 54; Eisenhardt 1989) and the testing of the edges of the emergent model.

Data was collected from multiple sources: semi-structured interviews, government documents, field observations, and secondary sources. Six to 10 informants were used in each case, and were selected from different levels within the government organisation in order to provide different perspectives.

Analysis was conducted with both a top-down and bottom-up pattern matching approach to measure the a priori constructs and to identify possible new constructs. For each case, evaluations of e-Government outcomes were linked with expressions of factors which resulted in those outcomes. A cross-case analysis was conducted to elicit commonalities and differences.

Strategies suggested by Yin to achieve construct validity, internal and external validity, and reliability were adopted to increase the robustness of the emergent theory.

4.1 Choice of Methodology

As can be seen from the literature (Chapter 2), the finding that skills and competencies impact the outcome of ICT implementation is not new. In fact, several quantitative studies (Al-Fakhri et al. 2008; Kalu 2007; Leitner 2006) have established skills such as ICT skills in general, general management skills, and process re-engineering, which are skills necessary for successful e-Government implementation. However, a quantitative study, while identifying the “what”, lacks the power to explain the “how” or the “why”. As the focus of this study is on “how” — the mechanisms by which skills and competencies affect the process of enactment — case studies, interviews and archival analysis are appropriate approaches (Yildiz 2007).

Cases study methods have a tradition in IS research. Case studies may use qualitative or quantitative data. Case studies may take a positivist approach (Yin 2009) or an interpretivist one (Walsham 1995). The distinguishing characteristic of case studies is that they attempt to study a phenomenon in its natural, real-life context (Cavaye 1996; Yin 2009). Therefore, as a natural experiment, no variables are controlled or manipulated by the investigator (ibid.). Instead,

multiple sources of evidence are used to develop results (Yin 2009). Qualitative case studies tend to capture rich, contextual detail that would otherwise be unavailable using quantitative methods. This contextual data is useful for understanding why particular decisions are taken (ibid.).

Case study research can involve one or more cases. They are useful in exploratory studies to generate hypotheses for further testing (Lee 1989), but can also be used to develop and test theories (Eisenhardt 1989). While not statistically generalisable, theories developed through case study research can be made theoretically generalisable by examining multiple cases in similar contexts (e.g. multiple firms in the same industry) (Cavaye 1996; Eisenhardt 1989). Multiple cases strengthen the generalisability of the theory, by either generating similar results under similar circumstances (logical replication) or by generating different results under different circumstances as anticipated by the theory (theoretical replication) (Yin 2009; Eisenhardt 1989).

The environment in which e-Government is enacted is complex, often involving multiple stakeholders and institutions. Environmental factors, institutional arrangements, and organisational structures may also impact skills development and e-Government outcomes in complex ways. For instance, skills and competencies of officers within the organisation may influence the technology outcome, as might organisational structures and processes. At the same time, the ability of officers and leaders to lead transformation may also impact the eventual organisational structures, and the technology outcome.

In order to capture the complexity of these interactions and the surrounding context, and because the study is seeking explanations for particular outcomes, a qualitative case study approach was chosen (Yin 2009, p. 18). A single ethnographic case approach would enable investigators to obtain detailed data from many sources within a single case, and in so doing, provide multiple perspectives on the phenomena. It would also be possible to study the single case over a longer period of time, capturing phenomena that may take more time to develop. However, to increase the generalisability and usefulness of the findings, a multiple case study approach was adopted. This approach allowed for a greater diversity of implementation contexts and outcomes to be studied.

4.2 Case Selection

The study calls for the investigation of e-Government in developing countries. This alone would differentiate this study from other work using the Technology Enactment Framework. Fountain's work was supported with cases originating from the United States Customs, Small

Business Administration and Army (Fountain 2001). Cordella used a case from the United Kingdom’s criminal justice system (Cordella & Iannacci 2010), and Gil-Garcia’s quantitative analysis was performed with data from state governments in the United States (Gil-Garcia 2012). No data from developing countries was used in these previous works. In addition, as a qualitative multiple-case study, it is the first to examine enactment across multiple government administrations and provide cross-country comparisons.

At the outset, officials from 17 developing countries were potentially accessible. From these possible candidates, the five cases were chosen primarily on the basis of whether: a) to the appropriate government officials based on the intended unit of analysis could be reached; and b) be available for a sufficiently long duration for adequate data collection. It was also necessary that one or more government departments had e-Government initiatives in progress. The five cases were assessed to see if they represented developing countries using three sets of measures – data from the World Economic Forum, World Bank and the UN e-Government Survey (See **Table 5**).

There is no universally accepted definition of developing countries (See Section 2.3). Within the UN, in common practice, countries in North America, Oceania, and Europe are considered “developed”, and there is a list of Least Developed Countries (LDCs). The IMF classifies the world into “advanced economies” and “emerging markets and developing economies”.

In order to establish the maturity of economic development in the cases under study, data from two sources — the World Economic Forum (WEF) and the World Bank (WB) — was used. Data on GDP and population was drawn from the WEF’s Global Competitiveness Report (Schwab 2014). The WEF divides economies into three stages: factor-driven, efficiency-driven, or innovation driven (numbered 1, 2 and 3 respectively). Economies can also be in transition from stage 1 to stage 2 (T1-2), or in transition from stage 2 to 3 (T2-3). Based on these benchmarks, the countries’ economies were categorised as ranging from stage 1 to stage T2-3.

Case Code	WEF Stage	WB Income Classification	eGov Development Classification
BR	1-2	High	High
BW	1-2	Upper-Middle	Middle
SL	2	Lower-middle	High
DN	1	Lower-middle	Middle
MR	2-3	Upper-Middle	High

Table 5 Characteristics of Cases

The World Bank classifies countries into four income groups based on Gross National Income (GNI) (World Bank 2014). These are: low, lower-middle, upper-middle, and high. It uses the word “developing” to describe low and middle income economies. The countries examined are middle income countries with the exception of BR, which has a low population, and so a high per capita income.

The United Nations e-Government Survey 2014 (Qian & Aquaro 2014) groups countries by their level of e-Government development into: Low, Middle, High and Very High. This grouping is based on the e-Government development index (EGDI) which has three sub-indices:

- a) the Online Service Index (OSI), which measures the availability of online services;
- b) the Telecommunication Infrastructure Index (TII), which measures overall telecommunications infrastructure; and
- c) the Human Capital Index (HCI) which primarily measures education and schooling.

The countries examined fell into the categories of Middle and High e-Government development. These are the two middle categories out of the four categories used by the UN e-Government Survey. They ranked from between 70 and 120 out of 193 countries for which data was collected. The rankings for the sub-indices also fell between 60 and 130 (See **Figure 9**).

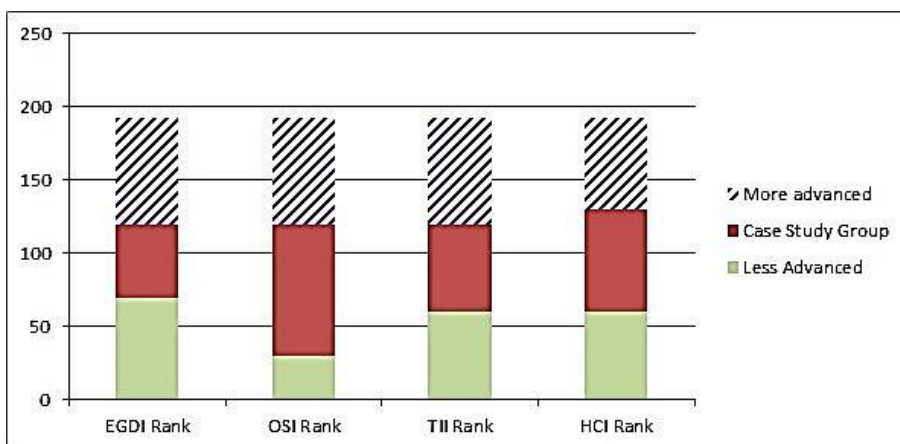


Figure 9 e-Government Development ranking of cases

Based on the foregoing data, it can be observed that these countries are “middle of the pack” countries. They neither fall into the classification of Least Developed Countries used by the UN (Nations 2013), nor do they rank highest in economic development, income or infrastructure. They are also amongst neither the lowest scorers on the EGDI, nor the highest. Arguably, these countries could be grouped into the category of developing countries.

As suggested by Eisenhardt (Eisenhardt 1989), theoretical sampling rather than random sampling is more useful in developing theory from case studies. While case selection was

severely constrained by access to appropriate government officials, the cases eventually investigated allow for likely replication or extension of the emergent theory. The cases have a number of similar characteristics, and sufficient variation that allows for theoretical replication (See

Table 5). Polar cases such as: BR and SL - in terms of income; and MR and DN – in terms of stages of economic maturity; allow for the testing of the edges of the theory. The remaining case provides a source of data to test for theoretical replication (Yin 2009, p. 18).

4.3 Unit of Analysis

The intended units of analysis were the administrative arms of governments. However, governments in various countries are organised differently. Some are single-tiered (e.g. Singapore, Antigua and Barbuda), but many others have three or more tiers: at the national level, at the provincial level, and at the municipal level (e.g. China, Indonesia, and Vietnam). Nonetheless, national level governments generally determine the country’s economic and development goals, and hence influence the use of ICT within its agencies and ministries in delivering services to achieve those goals.

The study examined only national level government administrations to allow for the comparison of data across cases. However, instances of ICT implementation are most likely to be found within a specific government agency or ministry, and the phenomena surrounding organisational structures and institutional arrangements are better observed at this level. The agencies implementing e-Government projects then formed the embedded units of analysis.

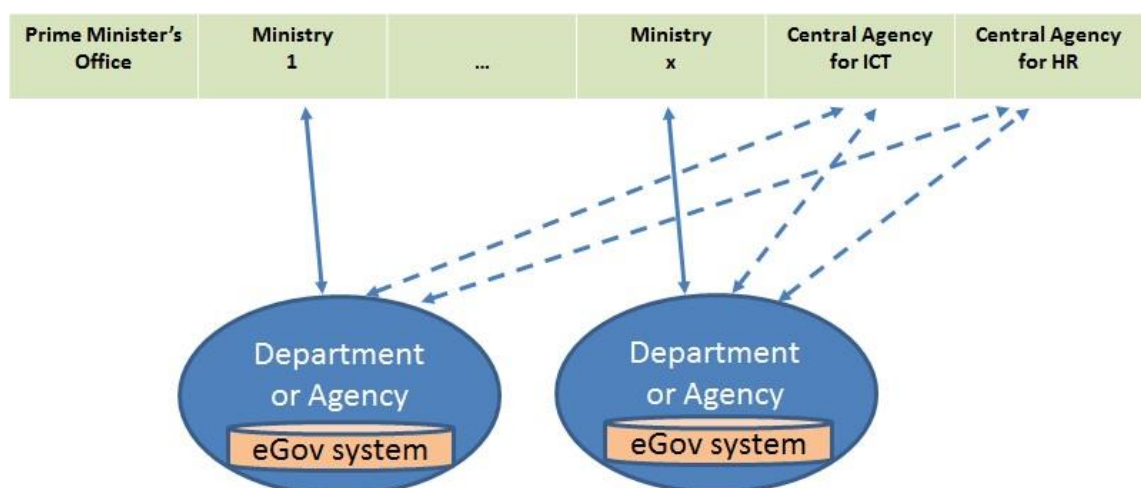


Figure 10 Unit of Analysis

Two national level agencies, if they exist, are likely to influence e-Government outcomes and skills development in individual agencies. One would be the central agency for information

and communications technology (CAICT), which may establish institutional arrangements around ICT procurement, implementation, and ICT staff deployment. Such central coordination may improve procurement and implementation efficiency (Doty & Erdelez 2002; Edmiston 2003; Hazlett & Hill 2003).

The other agency would be the central agency for human resources (CAHR). Human resource policies around training, compensation and reward would also have an impact on skills development and retention within the agency. The institutional arrangements surrounding these policies and the coordination may also impact on the skills within the implementing agency.

Data surrounding the agency implementing ICT, and its interactions with CAICT and CAHR, have therefore also been included in the study. As a result, the unit of analysis used was the national government administration. The government agency or Ministry implementing the e-Government system, and its interaction with the central agencies responsible for e-Government implementation (CAICT) and human resource management (CAHR) formed the embedded unit of analysis (See **Figure 10**).

One possible approach to developing a comparative case study model would be to hold constant the objective technology to be implemented. This would be difficult to accomplish given that different countries would be at different points of development. However, having different objective technologies also allows the testing of the emergent theory under differing conditions. In two cases (BW and BR), informants referred to multiple objective technologies.

Case Code	Embedded Unit of Analysis	e-Government System	CAICT	CAHR	Phase of e-Government Project Implementation
BR	Law Enforcement Agency Ministry of Finance	Case Management HR ePayment	Multiple CAICTs	Single CAHR	Formation and Operations
BW	Ministry of Home Affairs Prisons	National Identity Prisons Management	Multiple CAICTs	Single CAHR	Formation and Operations
SL	Ministry of Finance	Tax collection	Single CAICT	Single CAHR	Formation
DN	Statistics Office	Statistics Collection	Single CAICT	Not Applicable	Operations
MR	Citizen Information Division	National ID	Single CAICT	Single CAHR	Operations

Table 6 Units of Analysis in Cases

Projects in the five countries were at different points in the process of implementation. In some countries, informants referred to multiple projects and different stages of development. Projects in the “Formation” phase had not, at the time of the investigation, appointed an ICT vendor or decided on the technology that was to be installed in the organisation. Projects in the “Operations” phase had ICT systems that were installed and ready for use. The level of usage would vary with each individual case, and each individual project.

The various agencies and e-Government systems that formed the units of analysis in the five cases are mapped into **Table 6** above. In the cases of BR and BW, there were multiple coordinating agencies for ICT. In the case of DN, there was no central human resources agency at the national level: each agency managed its own personnel.

4.4 The Process of Data Collection

Data collection was done primarily through a combination of semi-structured interviews, document analysis and direct observation. Field notes from participant observation sessions were used in two studies. Data was generally collected over a period of six to twelve months for each case. A summary of sources of primary data can be found in **Table 7**.

Case Code	Collection Period	Documents Examined	# Informants	Composition of Informants
BR	February 2012 – July 2012	National Vision National e-Government Plans Project documentation from Steering Committee Meetings Organisation Chart	7	Govt Leaders – 2 Project Dir, Leaders – 3 Vendors, Users - 2
BW	July 2012 – December 2012	eGov Framework Document BPR Standard Operating Procedures BPR Study conducted by govt staff Partial notes of one project meeting Output of project discussions (in conjunction with field notes)	6	Govt Leaders – 4 Project Dir, Leaders – 2
SL	February 2013 – January 2014	e-Government Policy National Development Framework e-Government Progress Report 2011 Output of project discussions (in conjunction with field notes)	10	Govt Leaders – 3 Project Dir, Leaders – 4 Vendors, Users - 3
DN	March 2014 – March 2015	Assessment Report of Implementation written by consultants Project documentation produced by consultants	7	Govt Leaders – 2 Project Dir, Leaders – 2 Vendors, Users - 3
MR	October 2014 – March 2015	e-Government Plan Interim Study reports on ID Card implementation	8	Govt Leaders – 3 Project Dir, Leaders – 4 Vendors, Users - 2

Table 7 Sources of Primary Data

Three groups of people were identified as potential informants and candidates for semi-structured interviews.

- a) Government leaders and stakeholders: Politicians, permanent secretaries, local government leaders. These were chosen to provide the context of implementation: the strategy and developmental goals, and the institutional constraints and political environment in which implementation had taken place, or was intended to take place.
- b) Project Directors and Project Leaders: These were the people who were directly involved in implementing specific systems (the embedded units of study) within the government. Sometimes, representatives from reform groups or project specialists were available as informants as well. These representatives were chosen to lend insight to factors related to implementation and coordination issues. Some of these also played the role of eventual users of one or more systems.
- c) End-users and vendor personnel: These were the people tasked to implement systems on behalf of the government. End-users would eventually use the objective technology. Vendor personnel would lend an external, private sector perspective, and an external assessment of the skills, structures and challenges in implementing such projects. Some of these also played the role of eventual users of one or more systems.

Informants of type b) and c) would also have overlapping roles as users of the ICT system in some instances.

Based on the initial theoretical model and the constructs described in Section 3.3.1, the categories of informants, and documents to be examined, a data collection protocol was developed. The protocol links questions to be asked, informants, and possible evidential observations with the constructs under study. This protocol was tested on an initial case BR, and through a process of overlapping data collection and analysis (Eisenhardt 1989), was refined.

The most significant refinement arose from instances where informants mentioned the inability of certain government officials to perform their jobs. This led to questions surrounding institutional arrangements and organisation structures and processes such as measurements of performance, and the consequences of not meeting performance measures. These additional questions were then included in the protocol and used for subsequent cases. The final protocol used in the cases can be found in Appendix A – Data Collection Protocol.

Based on the protocol, a list of questions was developed as a guide to elicit information on the various constructs and relationships. Six to ten informants were used in each case study, with representation from all three categories where possible to get a triangulated view. Some

questions were constructed to elicit insights across multiple constructs (e.g. “*What are the difficulties in implementing <specific e-Government project>?*”). Responses would often cover institutional arrangements, organisational structures as well as skills and competencies. Interviews were semi-structured, with the questions used as a guide. Often informants would discuss aspects of other questions in the same category when asked the first, provide background or context, or would deviate to other topics of interest.

The interviews were conducted face-to-face, and generally lasted between 30 to 50 minutes, although a few lasted longer than an hour. In instances where consent was given, interviews were recorded and transcribed. In other instances when consent was not given for recording, extensive notes were taken, and a summary of the interview was written up within 48 hours. Emails were used to clarify uncertainties in recorded notes. In one case, interpretation was required, and a suitable local interpreter and facilitator was present at the interviews.

Documents that were examined were typically e-Government strategy presentations or papers, project documentation such as proposals, feasibility studies, and reports written by third-party consultants for the government agency on implementation strategy or evaluation of outcomes. Documents surrounding human resource policies were generally considered too sensitive by the government officials to be included in the study. Where available, the study was supplemented by the use of secondary sources, such as data from the World Bank, United Nations Department of Economic and Social Affairs (UNDESA), or other international development agencies. A profile of informants and documents examined is included in Appendix B – Sources of Data.

In two cases, the investigator also served as a participant observer. The investigator was employed by the government agencies under investigation to provide e-Government awareness training to government officials. Within these training sessions, government officials were divided into teams of four to eight participants, usually with four or five groups per class. Participants were invited to, amongst other things, discuss and identify specific e-Government projects (which may be new or ongoing), and identify objectives and impediments to implementation. Each team was then required to elect a representative to present their findings to the class for feedback. In these two cases, participant presentations represent a wealth of information. The investigator also made observations and took field notes on the presentations and interactions.

Data collected in such a fashion may suffer a bias as the investigator may influence the interpretation of the participants (Walsham 1995). However, it also has merits as it may provide an inside view which would otherwise be difficult to obtain. In these two instances, the creation

of a non-workplace, non-competitive environment geared towards problem identification and solution innovation also allowed for discussions across departmental lines, and resulted in a number of insights for both the participants and the investigator. Hence, the field notes and presentation outputs were included in the study.

4.5 Analysis

As discussed in the previous section, analysis and data collection often overlapped, especially in the initial case. In subsequent cases, observations and analyses were recorded in field notes, and draft frameworks for consolidating the data were constructed.

In developing theory using case studies, the theory is emergent at the end of the study, rather than fully conceived at the beginning of the study. It is still useful, however, to have an initial conception of the constructs to be investigated so that the instruments used for data collection can be designed to elicit data on these constructs (Eisenhardt 1989).

Construct Code	Name	Operational Definitions used
F1	Environmental Factors	Telecommunications infrastructure, electric power, insufficient funds, changes in government, level of general literacy
F2	Institutional Arrangements	Election cycles, laws governing the mandate of agency in case, formal roles defining interactions between agencies, normative behaviour
F3	Organisational Structures and Processes	Formal reporting structures, informal working relationships, work processes, management policies and whether or how they are enforced
F4	Individual Skills and Competencies	Competencies in planning, assembling necessary resources, process management, technology management and governance, project and contract management, technical and information architecture, using ICT systems under study to accomplish organisational goals
D	Enacted e-Government Implementation	Outcome measures in terms of service quality, responsiveness, costs of service provision, increased collaboration, as well as the intermediate measures of system quality, use and usability Achievement of stakeholder goals

Table 8 Operationalisation of constructs

With this in mind, an initial set of constructs were created and defined. The data was coded using nVivo software, and through the process of coding and analysis, sub-categories and elements within in each construct were identified. As the study is an exploratory one, examining how skills and competencies affect enacted e-Government implementation a pattern matching approach, coupled with iterative explanation building was used. Such an approach has been suggested by Yin (Yin 2009, pp. 141-144) as suitable for exploratory studies. In each individual

case, in addition to the top-down pattern matching approach, a bottom-up approach was also taken to see if there were factors, not already identified in the literature, that are inhibiting e-Government implementation. This bottom-up examination, more commonly used in interpretive studies, was used in this instance to validate the *a priori* model due to the exploratory nature of the study. No significant factors not already identified appeared to be present.

There were five major constructs used to guide the study. Four were adapted from the Technology Enactment Framework and its refinements: environmental factors (F1), institutional arrangements (F2), organisational structures and processes (F3), e-Government Implementation (D). Skills and Competencies (F4) was introduced as a new construct intended to extend existing theory. The constructs were operationalised using definitions discussed in the literature (Chapter 2), and a summary can be found in **Table 8**.

After each case, refinements were made as unique elements of subsequent cases surfaced. In particular, refinements were made to the coding of outcomes and skills which turned out to be more varied than provided for in the initial coding schema. For instance, the usability of deployed technology was affected by available software functions, connectivity with other systems, and availability. In the area of technical skills, on the other hand, skills shortages were caused both by a lack of competency in supposedly trained personnel, and insufficient numbers of trained personnel. Procurement skills were expanded to include the ability to justify and evaluate ICT investments, specify technology needs, and execute the procurement process. Within social and cultural factors, the issue of general motivation was also raised by informants and became a new coding category. After the final case was coded, earlier cases were reviewed and re-coded into the final coding hierarchy as necessary. The final coding hierarchy can be found in **Appendix C – Final Coding Tree**.

Analysis of the coded data was conducted to address the three research questions:

- 1) a) How do skills and competencies (F4) affect the enacted e-Government implementation (D) in developing countries? And b) How do Environmental Factors (F1), Institutional Arrangements (F2), and Organisational Structures and Processes (F3) influence skills and competencies in developing countries?
- 2) How do skilled actors influence e-Government implementation outcomes through perception, performance and improvisation, and sensemaking?
- 3) Which skills and competencies become important at different points of the enactment process?

To address the first research question, two assessments were made in each individual case study:

- a) If, and to what extent, environmental factors (F1), institutional arrangements (F2), organisational structures and processes (F3), individual skills and competencies (F4) contributed to the outcomes (D);
- b) If, and to what extent, environmental factors (F1), institutional arrangements (F2), organisational structures and processes (F3) contributed to the development and retention of individual skills and competencies (F4).

The findings from the individual cases are presented in Chapter 5. After each individual case was analysed, a cross-case analysis was conducted (See Chapter 6). Each of the factors was aggregated across the five cases. Pattern matching was used to identify commonalities and differences in the cases. This cross-case analysis also drew out gaps in skills and competencies identified by informants as most important to the process of e-Government implementation, and the impact of F1 to F4 on enacting e-Government implementation.

From the skills and competencies identified, a further analysis was conducted (See Chapter 7) to address the second and third research questions. The cases were examined to determine how skilled actors, through perception; better performance and improvisation; and increased sensemaking and communication affected the different phases in technology enactment. The analysis focused on contrasting outcomes obtained when skilled and unskilled personnel were involved in addressing issues encountered at particular points in the enactment process. Concurrently, the skills and competencies of the actors were identified in the context of skills and competencies already identified in the IS literature (See 2.4). This combined analysis addresses research questions 2) and 3) by identifying how:

- a) perception, performance and improvisation, and sensemaking; and
- b) general management competencies, technology management competencies and technical skills, and end-user competencies,

influenced enacted e-Government implementation outcomes through the Formation, Development and Operations phases.

4.6 Validity Tests

Several tests are commonly used to increase confidence that the findings of a study are valid (Yin 2009, p. 40). These include tests for the following:

- i. Construct Validity – identifying correct operational measures for the concepts being studied;
- ii. Internal validity – establishing true relationships as distinguished from spurious relationships;
- iii. External validity – the domain to which the findings can be generalised; and
- iv. Reliability – the extent to which the operations of the study, such as data collection procedures, can be replicated.

In all cases, some or all of Yin’s suggested tactics were used to increase validity. Multiple sources of evidence, including documentary sources, semi-structured interviews, and observations, were used to increase construct validity (See **Table 9**). For example, in the case of BR, documentary sources examined included National Vision, National e-Government Plans, project documentation from steering committee meetings, and organisation charts. Multiple informants with different profiles were used government leaders, project managers, and IT service providers. In addition, a chain of evidence was built linking informants, quotations from their interviews, and these constructs.

Case\Test	Construct Validity	Internal Validity	External Validity	Reliability
Tactics suggested by Yin (2009, p. 41) to achieve validity	<ul style="list-style-type: none"> • Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report 	<ul style="list-style-type: none"> • Pattern matching • Explanation Building • Address Rival Explanations • Use logic models 	<ul style="list-style-type: none"> • Use theory • Use replication logic 	<ul style="list-style-type: none"> • Use case study protocol • Develop case study database
BR	Documentary sources, multiple informants, observations, chain of evidence	Pattern matching, Explanation Building	Theoretical replication over multiple case studies	Use of case study protocol and database
BW				
SL				
DN				
MR				

Table 9 Tactics used to increase validity

Pattern matching and explanation building in cross-case analyses were used to increase internal validity. Consistent definitions (See 4.5) were used within and across each case to identify patterns related to the initial constructs such as the extent of Enacted e-Government Implementation, environmental factors, institutional arrangements, organisational structures and organisational skills and competencies.

A theoretical base was used to analyse the data (See 3.3). In each case, case data was mapped to the *a priori* theoretical constructs that formed the theoretical framework used for

analysis. Cases had characteristics that (See 4.2) allowed for theoretical replication and robustness for external validity.

To increase reliability, a case study protocol was developed and maintained throughout the data collection. In attempting to build theory from cases studies, it is not uncommon for analysis, protocol refinement and data collection to overlap (Eisenhardt 1989). This was also the case in this study. Data collection, analysis and protocol refinement was carried out in an integrated fashion in the first case study BR. Smaller refinements during the data collection and analysis of the other cases led to a final protocol (See 4.4). All data was stored and organised into a database.

As can be seen, strategies were implemented in all cases to increase construct validity, internal validity, external validity and reliability, and hence, to increase the confidence in the findings.

4.7 Summary

An embedded, multiple case study approach was used in the development of theory. Cases were selected based on availability and access to government officials, whether they had an ongoing e-Government initiative, and whether they might fall into a definition of developing countries. They provided sufficient variation to satisfy the needs of theoretical sampling, as well as to achieve replication. Pattern matching was used to measure the constructs initially conceived and subsequently modified as the study progressed. Tactics suggested by Yin were used to increase the validity and robustness of the study. The next Chapter presents the individual cases.

Chapter 5 Enacting e-Government: Cases from Five Developing Countries

Cases of one or more e-Government implementations in government administrations of five developing countries were examined. The five cases covered government departments in various stages of ICT implementation. While some progressed to the stage when the technology was eventually put in use, others had implementation delayed. A summary of the agencies and e-Government systems involved in each of the five cases can be found in Section 4.3, [Table 6](#) where the units of analysis are presented.

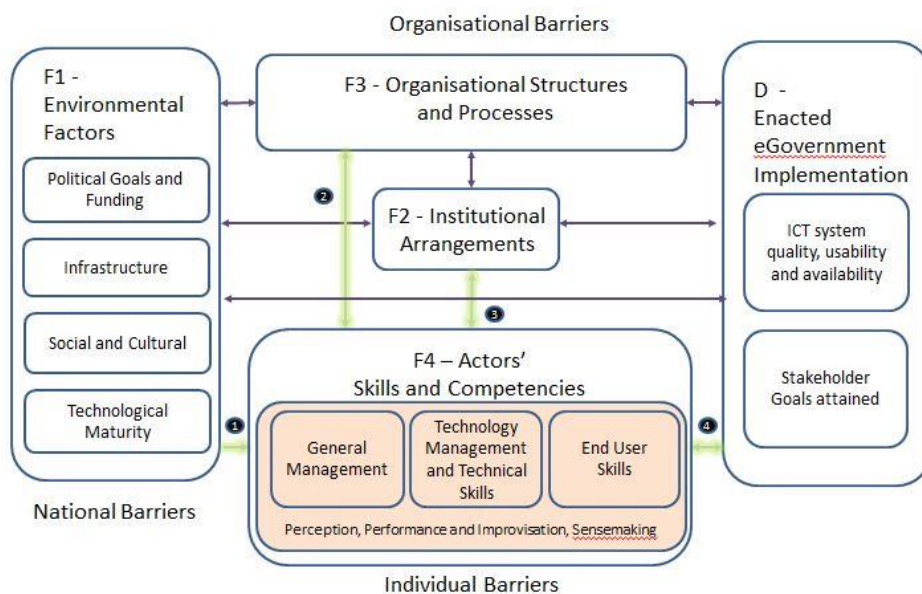
In first country, BR, a law enforcement agency that was in the early stages of implementing an ICT system. Informants also discussed a human resources (HR) system which was already in use, and an electronic payment system that was implemented, but had low usage. The agency system was eventually delayed because of institutional arrangements surrounding budgets, where multi-year project-based budgets were seldom supported. However, leaders and managers highlighted the following as causes: the inability to mobilise appropriate personnel for ICT projects; the lack of ICT management skills specifying system needs and in procurement; and the lack of technical skills despite high educational qualifications and certification. These skills-related factors affected the usability of the HR system, and contributed to poorer investment outcomes.

In the second case, BW, the government struggled with systems implementation across many agencies. While some systems had been implemented for the military and police, other ministries had difficulties in initiating implementation. While some environmental factors, such as the lack of physical infrastructure contributed to the implementation delays, leaders cited the lack of knowledge and ability to run an e-Government programme as a major cause. The lack of central coordination, as well as skills gaps in process design, procurement and change management also led to unclear value in systems acquisition: multiple copies of systems with the same functionality were purchased when only one might have been necessary.

In case DN, the implementation of a system that facilitated the collection and analysis of population and industry data for the purposes of informing policy decisions was examined. This system was implemented by the country's national statistics office. Clear objectives for the project were set. Though a mix of internal and external expertise, the project was broken down into manageable chunks and implemented in a manner which included skills development through on-the-job training. It was implemented with all major objectives accomplished, and government officers were able to operate the system on an on-going basis.

In case SL, the planned implementation of an ICT system within the tax and revenue collection agency of the government was examined. Implementation had been repeatedly delayed by institutional resistance to process changes. Complex procurement arrangements involving IDBs also complicated the acquisition of technology. While gaps in skills in change management, process design, technology management, procurement, and technical skills were also found to be present, it was too early in the process of enactment to determine if and how they would affect the eventual outcomes.

In country MR, a new ICT system was brought in to support the replacement of old paper identity cards with new chip-enabled cards. However, key stakeholders failed to determine the scope of the project, and set up clear roles, responsibilities and contractual obligations. This resulted in escalating disputes with and amongst vendors. The vendor project director was replaced twice during the course of the project. Nevertheless, the dynamic injection of skilled personnel allowed for changes in project organisation, implementation and operational processes. As a result, several major project objectives were achieved within specified timelines.



The following sections, 5.1 through 5.5, take us through each individual case. The analysis was conducted based on the a priori theoretical model described in 3.3.1 (See [Figure 7](#), reproduced above for convenience). In each case, the state of implementation at the time of the investigation is presented first. The possible contributors to these outcomes (D), classified based on the four factors in the theoretical lens — environmental factors (F1), institutional arrangements (F2), organisational structures and processes (F3), Individual Skills and Competencies (F4) — are presented. The effect of these factors on the development and retention of skills and competencies are then examined and presented. To protect the confidentiality of the informants, all agency and country names are disguised.

5.1 Case of BR

5.1.1 Background and e-Government Efforts

In this case, a law enforcement agency which was in the early stages of implementing agency-specific IT systems in support of investigation and rehabilitation was examined. The agency had hired external consultants to assist in the development of the processes and architecture of the new systems. The research study was conducted in a parallel but separate track from the consultants' work. In the process of the research study, informants discussed a human resources (HR) system that was developed by a central HR agency (CAHR), as well as an electronic payment system deployed by the Ministry of Finance.

Country BR has a small population with a high GDP per capita of over US\$40,000 (Schwab 2013-2014). While its economy is classified as transitioning from one which is factor-driven to one which is efficiency-driven, it remains a largely resource-based economy, with commodity exports exceeding 60% of GDP. It is ranked in the top 30% of countries surveyed by the UN (Qian 2012) in terms of human capital which measures literacy and enrolment in formal education, with its literacy rates exceeding 90%. The government remains the major employer of all citizens. Country BR ranks in the top 25% of 177 countries in corruption perception by Transparency International (www.transparency.org).

Country BR is governed by a hereditary monarch through cabinet ministers. The national government is divided into about twelve ministries. The country is relatively small in size, and it is divided into four administrative regions. However, almost all policy decisions are made by the national government.

Country BR launched its first eGovernment framework in 2001 and embarked on its integrated e-Government journey in 2005 after a review by the country's Information Technology Council. A government authority, the Technology Authority was established to pursue these goals. It subsequently published an e-Government Strategic Plan 2009-2014 and established a Central Agency for ICT (CAICT) under the Prime Minister's Office to coordinate and execute the strategy. The Technology Authority was subsequently subsumed under CAICT.

However, after many years of effort, Country BR's e-Government websites remain largely in the interactive stage in models proposed by Ronaghan (Ronaghan 2001) and Chan (Chan, Lau & Pan 2008). That is, it is possible to find some information on government services and processes, and download forms for some transactions online. However, there are few, if any, transactions that can be completed online. The level of ICT adoption varies across the

government: some processes remain largely paper based, with a few ministries and agencies having standalone systems.

5.1.2 State of Implementation

In examining the case of Country BR, three systems were discussed by informants. The first was a human resource system (HRS) which, amongst other things tracked staff attendance, leave and training. It was at the time of the investigation, in use by most of the civil service, including the law enforcement agency under investigation. The second system (PAY) was a payment mechanism. It was intended to be used by the public and businesses in its interaction with the government. It was launched by the Ministry of Finance, and some informants referred to it in their capacity as end-users.

The third system (LES) was being designed for a law enforcement agency. At the time of the investigation, the agency was responsible for investigating offences related to illegal drugs. Offenders trafficking, possessing or using illegal drugs, were investigated and prosecuted by the agency. The agency also ran rehabilitation centres, where users of illegal drugs were detained and rehabilitated. Upon release, this group of offenders would also be required to visit agency officers for a period of time, to ensure that they continued to abstain from using drugs.

The agency was divided into units, variously responsible for investigation and prosecution, administration of the rehabilitation centres, and post-release supervision. Other staff units were involved in preventive education, logistics, and policy research.

At the time of the investigation, several personal computer-based standalone systems were in use. The data was kept in databases or spreadsheets which resided on particular PCs. As a result, there was no linkage and sharing of data across units. Someone who was investigated, detained and released for supervision might have three, possibly inconsistent records in three systems across three units within the agency. This made it difficult to obtain management data, and resulted in unnecessary effort in keeping records consistent. Hence, the leader of the agency was eager to develop a more integrated system, and hired external consultants to help with its design.

The agency went through a process redesign study with the consultants, and developed integrated processes across its operating units, which then determined the design for the new ICT. However, while the new design was accepted by the leadership of the agency, institutional processes around budgeting and procurement significantly delayed the implementation of the system.

As discussed in Section 3.2.1, system quality, information quality, use, and user satisfaction (DeLone & McLean 1992) and serve as useful measures of e-Government implementation.

By some of these measures, the outcomes of these three systems were mixed. While all informants cited some degree of adoption by the intended users of the system, outcomes included:

- 1) *Low or Poor connectivity.* Often the network within the government was unreliable. Various government sites were not connected, even twelve years after the inception of an e-Government programme. Four out of seven informants expressed dissatisfaction with accessibility and connectivity. It is interesting to note that internet connectivity was available in commercial sites such as hotels and shopping malls and seemed to be more reliable than that within the government. The country was ranked in the top 30% in e-Government in a survey carried out by the United Nations (Qian 2012), and within the top 30% in terms of telecommunications infrastructure.
- 2) *Non-functional or functionally incomplete systems.* Besides statements on IT systems in general, several informants referred to the HRS as an example of a system which did not meet their needs. In the law enforcement agency, many officers worked in shifts around the clock. Part of the functionality of the HRS was to track attendance. However, the system assumed that a work day started and ended within the same calendar day. Officers working the night shift which started at 10 p.m. on one day and ended at 7 a.m. on the next day could not use the system for this purpose. One informant said that it was more difficult to use the HRS to apply for leave than the old manual system. In the case of the PAY system, when the system was delivered, there was a dispute about whether the system met the specifications of the government. At one point, the government representative sought to have a third-party assessment as to whether the vendor met the terms of the contract.
- 3) *Low Adoption.* In the case of PAY, where usage was not mandated, unlike the HRS, adoption by the target group of members of the public and businesses was low.
- 4) *Delay in implementation of systems or non-implementation.* It was not uncommon for the implementation of planned systems to be delayed, in some cases indefinitely. In the case of PAY, after an initial consultancy to determine the

parameters of the system, an attempt was made towards implementing and procuring the system using internal resources, but this failed. In the case of LES, a consultancy for the parameters of the system, associated new processes, high level technical design and budget was completed in about six months. However, after the conclusion of the consultancy, the law enforcement agency struggled to move the project towards procurement and implementation. One year later, key procurement processes remain uninitiated.

- 5) *Unclear value in IT procurement.* A senior leader openly admitted the government's inability to assess the value of systems procured. Technical managers expressed difficulty in evaluating IT systems and vendors. In one case, where positive feedback was given regarding the speed of implementation and procurement, items procured were desktop equipment and end-user computing devices. In this instance, it was unclear whether the procurement of newer devices was driven by organisational needs, and many older, still functioning devices were already in use.

5.1.3 Possible Contributing Factors to State of Implementation

In investigating the possible causes and contributing factors to the outcomes identified above, constructs from the *a priori* theoretical model (See [Figure 7](#)) were used as possible anchors for the data. Investigators, however, remained open to other possibilities described by the informants. A summary of the possible causes and associated informant responses can be found in [Table 10](#).

5.1.3.1 Environmental Factors

The low adoption rate of PAY seems to be related to lack of trust in electronic systems and the requirement for substantive proof that a transaction had occurred. However, the evidence for this was limited as only one informant cited this as a possible cause.

The telecommunications infrastructure is ranked within the top half by the United Nations (Qian & Aquaro 2014). However, within the government, lack of physical telecommunications infrastructure linking various government agencies was cited as one of the causes of poor e-Government outcomes. In addition, connectivity and bandwidth were cited as problems by multiple informants.

	State of Implementation	Theoretical Construct	Possible Contributing Factors	Coded responses from informants	Informant
1.	Low or Poor connectivity	F1 Environmental Factors F4 Skills and Competencies	Lack of physical infrastructure Lack of technical skills	<p>"The connectivity and reliability needs to be improved. The bandwidth is unreliable. This is coordinated by [local government authority] and [local telecoms company]."</p> <p>"... take for example in the government, not all sites are connected."</p> <p>"Sometimes we cannot tell why the network is slow. We don't have any network monitoring tools and are very dependent on the external vendors to fix our problems."</p> <p>"We also have many graduates, but something seems to be missing in our curriculum. When they graduate, the still cannot solve the technical problems on the ground."</p> <p>"as much as they want to speed it up, they don't have it. The email is slow. The connection is poor. You don't know who to ask for help there. They do come to you. Uhh but sometimes they have to come several times before they get it resolved."</p>	BR7 BR1 BR4 BR4 BR2
2.	Non-functionality or incomplete functionality in systems	F4 Skills and Competencies F4 Skills and Competencies	Lack of process design and re-engineering skills Lack of skills in procurement	<p>"Sometimes we pick a solution but we don't understand the full implications until it is installed, then we find that it doesn't completely meet our requirements."</p> <p>"they don't have coordination with the different ministries and they don't take into account the different ministries requirements into this e-Government."</p> <p>"I don't think it's(<i>sic</i>) work from the agency's point of view."</p> <p>"The government must allow the vendors to learn, you know, trial and error, trial and error. They also learn, what, they also try and then retry."</p>	BR4 BR6 BR3 BR7
3.	Low Adoption	F1 Environmental Factors	Lack of trust	"The public uses it, but the e-payments are not in wide adoption because they feel that there is no receipt or acknowledgement."	BR7
4.	Delay in implementation or non-implementation	F1 Environmental Factors F4 Skills and Competencies	Physical infrastructure Management and leadership	<p>"Firstly, the infrastructure readiness. Umm we're still not at a level where we need to be at. Even after 12 years of e-Government programme."</p> <p>"the consultancy outcome of it was supposed to have identified a team which is supposed to be identified by the ministry of finance themselves to step up ... we wanted to get voluntary support from respective ministries ... Because that was not forthcoming or in case they came they disappeared and never turn up or never return. So as a result, they say this is taking too much time. So at the end of the day, we said okay let's give it to the consultants to manage."</p> <p>"I find a lot of people are frightened and then they say okay can you get involved yourself. In this my experience, I said can you get yourself involved in this. Initially they say what is it all about? And then they say no, no, no. And at the end of the day, you have to force people to join."</p>	BR1 BR2

		F2 Institutional Arrangements	<p>Project management</p> <p>Management and leadership</p> <p>Lack of technical skills</p> <p>ICT investment and procurement process</p>	<p>"... like a perennial problem is I guess project management skills." "... mostly it's just supervise them and status updates. We just manage ... the logistics stuff"</p> <p>[on lack of support for IT projects] "... if we don't engage them face to face, to tell them what is in it for them. Because we want to tell them it's a win-win for both and for Country BR as a whole. But we don't do that enough. We just send a letter."</p> <p>"Today, they are technically, they are not exposed, and lack of knowledge of what is available in the market. And they do not have the right people in the right place."</p> <p>"You have to utilize the prior year budget before you can ask for a new budget ... your project may have changed its requirements, and may need a slightly higher budget, but they are told because of the bureaucracy in the various ministries that basically they have to ask MOF for it. But MOF people is just 'Money, I manage. That is my procedure, I cannot change' ... And all the agencies below will hit a road block because they say MOF say no money. You must use your current money ... So it's like, for example, they need 2.5million, but they only left 1 million in their budget. Then they will come back to the vendor and ask "Can you do this first for 1 million?" which is sometimes totally impossible to execute. It is meaningless." "it takes very long. It takes traditionally more than 6 months. From the start of a procurement process until the company is awarded a particular project."</p>	<p>BR1 BR3</p> <p>BR2</p> <p>BR5</p> <p>BR5</p> <p>BR1</p>
5.	Unclear value in IT procurement	F4 Skills and Competencies	<p>Procurement skills</p> <p>Management and leadership</p>	<p>"I admit openly that we have not been very good at measuring the returns of the projects. Umm we've spent many million dollars on systems and things of such and so on. But we have not assessed what are the returns uhh of this investment." "... evaluation of an application, but he is just probably a very junior guy, into the job for only 6 months, and he is not IT trained. His background may be studying some finance, some business admin, and was parked to do IT." "What we find is that the committee may not be able to evaluate on a capability basis. But rather very much, very strong lean towards price." "We have difficulty in evaluating one vendor over another. There is no systematic way that we use to compare vendors. We don't have the tools and techniques. Sometimes we ask different people about their opinion, but how to do we know that their opinion is right."</p> <p>[On the number of personal computers]</p>	<p>BR1</p> <p>BR5</p> <p>BR4</p> <p>BR3</p> <p>BR5</p>

				<p>“Lost count already for our department. It’s so many. So many. I think more than three hundred. I think before ... we have our old computer. Put it aside first ... I lost count already.”</p> <p>“because the policies are all written for manual, to change the policy is another major hurdle. Nobody would want to write, because they have to go through all the minister level, to consent for the change ...”</p>	
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Table 10 Possible contributing factors of e-Government Outcomes (BR)

Senior government managers say that funding was adequate, with more than a billion dollars allocated from 2000. This was not cited directly by informants as a barrier to implementation.

5.1.3.2 Institutional Arrangements

One possible reason for the lack of adequate communications infrastructure within the government may be the separation of roles between CAICT, responsible for e-Government implementation, and Telecoms and IT Regulatory Authority (TRA), which was responsible for deploying telecommunications infrastructure. Also, it appears that the task for connectivity was to be implemented by the local telecommunications company – a commercial entity. A single entity coordinating both IT adoption and infrastructure deployment may produce different outcomes.

Two institutional arrangements seem to directly cause delayed or non-implementation of systems. The first is a long procurement process. Multiple parties are involved in the preparation of the tender documents: the government's legal representatives, the central e-Government coordinating agency, and the ministry or agency intending to procure the IT system itself. After submissions are made, the evaluation process itself is often extended, compounded by the lack of ability or confidence of the procurement team in evaluating solutions (see 5.1.3.4 below).

The second institutional arrangement that seemed to impede implementation surrounds the budgeting cycle and process. In the case of the LES, consultants recommended an integrated system to replace standalone systems that resided in four divisions within the agency. The projected cost of the system exceeded the budget for the year by approximately 150%. While funds had been set aside for e-Government projects, these were inaccessible in between budget planning cycles. Variance processes either did not exist or were considered by officers to be very difficult to execute. Instead, the agency was encouraged to expend funds already allocated on something which did not necessarily meet their needs or else not implement anything at all.

"I won't change, because if I change, I have to write paper. And I don't want to write paper, write justification on why I should change."

[BR5, Comment from vendor on government personnel]

5.1.3.3 Organisational Structures and Processes

Delays in implementation also appeared to be caused by the lack of a structured or established way to garner resources and engage collaboratively across government agencies and departments.

“When we want people to participate in e-Government projects, uhh a lot of ministries are not willing to volunteer their best officers. So they send the second best or third best...”

[BR2, Senior government leader]

One senior leader (BR2) suggested that this might also be related to influencing skills and the means by which communications are made:

“...we don't engage them face to face, to tell them what is in it for them. Because we want to tell them it's a win-win for both and for Country BR as a whole. But we don't do that enough. We just send a letter.”

The lack of a collaborative coordination process in the implementation of large IT projects also resulted in the lack of appropriate functionality for the HRS. The project appeared to have been driven by one ministry, with the resulting system imposed on the rest of government. Two informants cited the lack of consultation and coordination as the major cause of the system not meeting user requirements. Although the central e-Government coordinating agency was in existence at the time of project implementation, it is unclear that it played a role in coordination or implementation of the project.

5.1.3.4 Skills and Competencies

A consistent thread throughout all the interviews with the informants was the presence of a skills gap. Informants consistently identified a lack of skills as a reason for the mixed outcomes in e-Government. These generally fell into one of four categories:

- a) *Lack of technical skills.* This was cited as contributing to poor connectivity, and the inability to maintain the communications infrastructure. It also led to delays in implementation or non-implementation of systems. Other skills mentioned as missing or inadequate included database design and administration and process reengineering.
- b) *Lack of skills in procurement and solution evaluation.* This ranged from the inability to quantify the benefits of an IT investment to inexperience in comparing proposed solutions. Officers lacked confidence that they have secured systems which are appropriate and are worthwhile investments. Sometimes, this resulted in disputes with vendors.

- c) *Lack of general management skills.* Managers lacked the skills to secure necessary organisation resources in support of e-Government projects resulting in delays or non-functional systems. In some instances, they were unable to address the fear expressed by some staff members and motivate staff members to participate actively and contribute to the e-Government projects. There appeared to be a lack of ability or willingness to press for necessary policy changes that would make the IT systems procured more effective. In addition, IT assets were not always properly managed.
- d) *Lack of project management skills.* Project management skills were cited specifically by senior managers as a gap. Conversations with on-the-ground IT managers and project implementers showed that they were seldom involved in planning or management activities such as determining tasks to be executed, and the sequencing of such tasks. Instead, they played coordination and administration roles: organising meetings, following up on action items required by vendors, and administering payments.

The skills gap appeared to apply both in terms of quality as well as quantity. The expectation and demand for skilled personnel from the line ministries appeared to be higher than what could be provided for by the central IT agency.

“We have very little skilled expertise. Which means we have only a handful. That’s why we rely heavily on CAICT. And CAICT, they are so stretched on resources. They only allocate us IT support like 3 or 4 in respective ministries.”

[BR2, Senior government leader]

“CAICT is formed in a sense as a central government to help the agencies, but their role sometimes is very much technical in nature, infrastructure basis. They fail to see what the respective agencies’ business are, what their business needs are. They cannot appreciate, and they cannot understand and therefore most of the time, they cannot add value...”

[BR5, Vendor project manager]

Interestingly, there were mixed views on IT literacy. One informant said that 60% of government people are not aware and not confident in using IT, another suggested that in implementing projects, IT literacy needed to be considered. However, two others observed the increasing use of iPads, tablet computers and other mobile computing devices, and suggested that in fact, most people were IT savvy and capable of using computers. In addition, the head of the law enforcement agency, pointed out in an informal occasion how all his officers seemed to be IT savvy and were carrying tablet computers everywhere, including during lunch. And yet some officers expressed fear when required to be involved in IT projects in the office context. This seems to suggest that beyond general IT literacy, that there remains some other factor that deters officers from participation in IT projects.

5.1.4 Factors influencing skills development

Having established that a skills gap existed, environmental factors, institutional arrangements or organisational structures were studied to see if they contributed to the gap. A summary of findings can be found in **Table 11** below.

Theoretical Construct	Possible Factors	Coded responses from informants	Informant
Environmental Factors	Social and Cultural Factors	"... one of the reason is, they are, they are not, what you call, not hungry."	BR5
Institutional Arrangements	Capacity building framework	"We have to agree on which are things that we want to do, and these are the trainings that we want to attend" "We don't have a very clear staff development plan, but our public service college (IPA) has many IT courses every year." "It's decided by the CAICT. That's more on the technical aspect. But we have to identify staff throughout the ministry on what kind of IT training to be given. From the basic to the more advanced level."	BR6 BR4 BR2
	Other central HR practices	"one of the reasons is there is no human resource planning. They give out a lot of scholarship, every one of them is on scholarship, but there is no planning of what is the resource need down the line, versus what they want to sponsor people to study." "Some will be rotated, especially key postings, like the director level, deputy director, or manager level. They will be rotated, from agency to agency. So when they rotate, all the knowledge, information, goes with them."	BR5 BR5
Organisational Structures and Processes	Skills development and retention processes	"Some of those who go for training are not the best, and they may not be going there to learn. They are picked based on seniority, not because they are good."	BR4
	Appointment of personnel	"Or they are put there because they can't do other jobs, and we don't want them to rebel."	BR4
	Measurement and KPIs	"There is no accountability, there is no responsibility, there is no urgency, in having things done." "There is no KPI. I have been told by one of the CIO there is no hire and fire policy. Even if you do not meet the KPI, you are like in a way very lenient." "Today there is no penalty if you don't do things, you are not performing, there is no penalty. I still get my salary, I still get my bonuses, why should I do more?"	BR5

Table 11 Possible factors influencing e-Government skills development (BR)

5.1.4.1 Environmental Factors

There appeared to be little evidence that environmental factors had a strong influence in the level of e-Government skills within the ministries. The country has high literacy rates. e-Government appeared to be a priority, with plans and funds allocated to its development. These funds were also allocated for training, and were administered by the CAICT. In addition, the government provided generous scholarships for training and education, with students sent to universities in Singapore, Australia and other countries with developed economies. A foreign informant commented that the culture appeared to be more laid-back and less aggressive than those in other countries. It is unclear how this has impacted skills development in the government.

“From all the observations, it is that it is basically that it is lack of skilled people. Lack of people, lack of will. Because what I see is, one of the reason is, they are, they are not, what you call, not hungry. They’re well ... There is no competition ...”

[BR5, Vendor project manager]

5.1.4.2 Institutional Arrangements

However, several institutional arrangements seemed to have contributed to the lack of sufficient e-Government skills. The first surrounds the role of planning for staff development, which seemed unclear. In some ministries, it appeared that the ministry was responsible for training; in others it seemed that the CAICT was responsible for planning training. The CAHR provided a menu of courses, but did not seem to coordinate with the ministries on what courses might be useful and relevant. At the time of the study, however, investigators were told that, the administration of IT training was being consolidated under the CAICT.

The planning process itself seemed to be only partially effective. The government continues to remain the largest employer, and many students still wish to join the government when they graduate. However, students who completed their studies sometimes find themselves unable to be placed in a position where their skills are relevant.

A second institutional arrangement possibly contributed to the loss of institutional knowledge. Staff members in key positions were rotated once every two years from agency to agency. This in itself may benefit the government as it provides staff members with exposure to different job roles and perspectives allowing the development more holistic solutions to administrative problems. However, the transfer of knowledge when this happened appeared to be incomplete. Vendors find that if this happens in the middle of an e-Government project, a significant amount of re-education had to take place.

5.1.4.3 Organisational Structures and Processes

Several organisational structures and processes seem to deter the development of skills within the government. While many government officers are sent for training, they may not be selected because they are expected to perform the tasks for which they are to be trained. Seniority within the organisation was a primary criterion. Similarly, the placement of officers into various job roles did not appear to be necessarily based on competency. Sometimes officers not competent in other roles were placed into IT related roles in order to pacify them, so that they would not “rebel”.

A key factor appeared to be the lack of incentive and performance orientation. It did not matter to the officers whether they were competent, since they were unlikely to be fired, or even suffer any penalty for not doing their jobs well. Thus, officers did not appear incentivised to acquire skills relevant to the job they were asked to do.

5.1.4.4 Other factors

One other interesting factor was raised by an IT manager (BR4). He pointed out that

“We also have many graduates, but something seems to be missing in our curriculum. When they graduate, they still cannot solve the technical problems on the ground... Sometimes we send people overseas, and attached to vendors, one year, three years, but when they come back they cannot solve the problems at home.”

This seemed to happen even when the students graduated from universities ranked amongst the top 50 in the world, and the attachments were to world-class multi-national IT service providers. These suggest that there may be factors unique to the country and its infrastructure which require greater expertise to solve. Indeed, the manager (BR4) suggested:

“The best way seems to be to hire the technical experts to work here in Country BR, then have our staff follow them. When the technical experts go and fix a problem, our staff can go with them and learn. This way, over time there can be knowledge transfer, and the simpler problems we can fix ourselves. We need to do more of this.”

5.1.4.5 Summary of factors influencing skills development

The lack of skills seemed to be affected by the institutional arrangements surrounding staff development, the organisational practices surrounding appointments of officers and rewards for performance, and perhaps the training pedagogy (See **Figure 11**).

There was little or no structured planning to develop skills and map skills and competencies to job roles. Mandated job rotation, intended to give key officers exposure to a

variety of job roles often resulted in insufficient skills transfer between incumbents and the new personnel taking over.

Employees selected for training were not always based on the needs of their job, and similarly, were not always placed in job roles based on their competence. There were few or even no consequences for not fulfilling the requirements of the job.

While many of the government officers had higher educational qualifications or professional certifications, technical managers often found that they were unable to perform the tasks required of them. Managers attributed this to the lack of in-country and on-the-job experience.

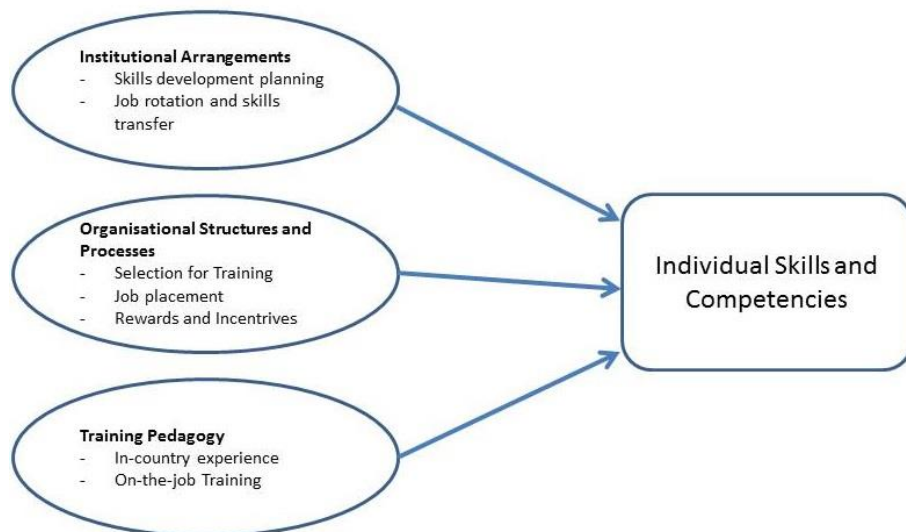


Figure 11 Factors influencing Skills Development in BR

5.1.5 Summary of Case

As suggested by Fountain and Gil-Garcia, environmental factors, institutional arrangements and organisational structures and processes all have a direct impact on the implementation outcomes.

Environmental factors such as lack of trust in electronic systems and poor connectivity within and amongst government agencies contributed to low adoption rates both by the general public, and by government officers.

Long procurement processes, and restrictions on multi-year budgets inhibited the deployment of large systems. This was compounded by the lack of collaborative processes

across government agencies in large systems implementation, especially around the mobilisation of appropriate personnel, and the incorporation of diverse needs.

In addition, the lack of skilled personnel also played a very significant role in delayed or non-implementation. Skills and competencies identified by managers range from technical skills, procurement and project management competencies, and the general management ability to mobilise appropriate and necessary resources within and across agencies.

Skills development and retention was retarded by the lack of structured skills development and planning, which included personnel sent for training which was not relevant to their job roles. Job placements were sometimes not made on the basis of skills, and officers were seldom rewarded for competence or meeting performance goals. In addition, while many officers held degrees in higher education or professional certification, the lack of in-country and on-the-job experience made them unable to perform tasks expected of them by their managers.

5.2 Case of BW

5.2.1 Background and e-Government Efforts

In this case, investigators worked with the central government's human resources agency to provide capacity-building services for the purposes of e-Government. As part of the work, investigators provided a number of workshops to senior leaders, project managers, and process improvement teams of various government ministries.

The research was conducted in a separate but parallel track to these capacity building workshops. Focus on a single agency was made more difficult by the fact that there were few projects outside of the military and police that had progressed beyond the very early stages, and because of the whole-of-government strategy adopted for e-Government implementation. As a result, informants in the research project not only included senior government leaders involved in the overall e-Government programme but also officers from ministries dealing with national identity, prisons and water management

Country BW's per capita GDP has risen steadily over several decades and it is now classified as an upper-middle income country by the World Bank with a per capita GDP exceeding US\$9,000 (Schwab 2013-2014). Its economy is classified as transitioning from one which is factor-driven to one which is efficiency-driven, but it remains a largely resource-based economy, with mining and related activities exceeding 40% of GDP. The government is a major employer and accounts for more than 35% GDP. In terms of literacy, BW is in the lower half of countries surveyed by the UN (Qian 2012). Country BW ranks in the top 25% of 177 countries in corruption perception by Transparency International (www.transparency.org).

Country BW holds democratic elections with a national level parliament. The administration is divided into approximately 15 ministries, covering areas like agriculture, mines, water, health, education and other services. There are multiple levels of government, with the country divided into approximately 12 provincial and municipal administrative regions.

At the time of the investigation, e-Government programmes in Country BW had already been running for more than six years. The various ministries and agencies were grouped into 14 thematic "clusters" which were meant to drive e-Government initiatives. This was driven by a philosophy of a "whole-of-government" approach to e-Government. Multiple departments seemed to be coordinating efforts, including the office of an e-Government coordinator, the office of an e-Government comptroller, and an ICT department within the communications

ministry. However, many of the projects had not yet taken off, or were stalled in the early stages.

As a result, the management of these programmes was undergoing a transition. There was recognition that the government lacked the necessary skills to implement e-Government, and multiple consultants were invited to provide training and capacity-building services.

5.2.2 State of Implementation

In Country BW, several ICT systems were implemented. These were primarily in the Police, Civil Aviation Authorities and in the military. However, despite having an e-Government plan for more than five years at the time of the investigation, a number of ICT initiatives had been delayed, and few systems were implemented in the rest of government. While interviews were centred on a possible National ID system and prisons system, informants discussed the delayed or lack of implementation of systems across government.

Some sub-optimal outcomes after a number of years of e-Government implementation included:

- 1) *Low or poor connectivity.* Although there has been substantial investment in improving connectivity within the country, costs for private access to the internet remain high by local standards. Within the government connectivity remains slow, and it is unclear if network connections to the government systems were adequate.

"We have laptop, we have computers we have all that but network, our network is so disappointing, very disappointing. I think if we were to transact online right now, people will still be frustrated because of network issues. We have the services online, but then people will not be able to use them because of our network."

[BW1, Project Leader and ICT user]

- 2) *Delay in implementation of systems or non-implementation.* Improvements that were planned through the use of ICT were often not implemented.

"...we don't really feel that there's something going on. Really at a snail's pace. We identified low-hanging fruit for more than two years. And if it takes more than two years, it can no longer be low-hanging fruit."

[BW3, Senior government leader responsible for e-Government implementation]

While isolated systems appeared to be in use, systems supporting core functional processes in the Prisons department were not present.

"Right now, we all use different systems [for agencies in the Law and Justice Cluster]. There is currently no IT system in use by the Prisons department."

[BW4, Senior Prisons official]

- 3) *Unclear value in ICT procurement.* During the period of the investigation, the government was in the process of improving its ICT procurement. There were

instances where multiple systems with similar functionality were purchased by different departments or ministries, including two fingerprint identification systems and five geographical information systems.

“In particular, value for money, there must be a way where you would actually evaluate the system, whether it is value for money. But whether they do it then we may, I suspect, would not be so.”

[BW5, Government Leader]

5.2.3 Possible Contributing Factors of Mixed Outcomes

There appeared to be a number of contributing factors for the three mixed outcomes. External to the individual government agencies and ministries, the physical ICT infrastructure seemed still to contribute to the lack of connectivity. There were mixed perceptions of government goals and priorities, unclear roles for ministries, and complex procurement processes involving multiple stakeholders. These factors contributed to delayed projects, and in some instances caused multiple systems with similar functionality to be procured.

From the skills perspective, the main factor in delayed implementation seemed to be a lack of ability in general management and change leadership. Leaders expressed a lack of in-depth knowledge on what to do and how to get it done. This resulted in unclear directions at the working level, and the inability to mobilise the right resources. In addition, commitment to eGovernment initiatives was reported as poor. Project management skills were in short supply, with certified project managers unable to do the job. Five out of six informants identified this as a major cause of delayed implementation. Other skills surrounding data sharing and governance, process redesign, and general ICT literacy were also found to be lacking.

A summary of the possible causes and associated informant responses can be found in **Table 12**.

5.2.3.1 Environmental Factors

At the time of the investigation, e-Government programmes in Country BW had already been running for more than six years. While the management of the programmes seemed to be undergoing a transition, most informants *did not think that funding was a major impediment* to implementation. However, informants had many *different perceptions of government priorities*: ranging from infrastructure, economic diversification, government efficiency and integration, and poverty eradication. Notably, senior leaders and junior staff had very different perceptions.

	State of Implementation	Theoretical Construct	Possible Contributing Factors	Coded informant responses	Informant
1.	Low or Poor Connectivity	F1 Environmental Factors	Physical infrastructure	<p>Yes we can connect across government. Although sometimes internet is a problem because it's just mixed, but the speed and stuff like that, but it's something that, in my view is temporary, because as we bring in other things ... yes we have fibre-ings and all that, but we are not futuristic in terms of speed, so it was an overkill. But they are working on that now.</p> <p>Really I think the only thing is that, the slowness of the, sometimes of the internet, not working, all those things, we have to do the infrastructure.</p>	BW5 BW3
2.	Delay in implementation or non-implementation	F1 Environmental Factors F2 Institutional Arrangements F3 Organisational Structures and	Government priorities General and ICT literacy Other institutional arrangements Project organisation	<p>So instead of us making sure that the services are up and running, so that when they come for help, it gets to be done on the spot, we want them to be happy ... we are running with poverty eradication, rather than making sure the services inside government are up and running.</p> <p>in most cases the younger generations, mainly those who either at higher secondary school, which is high school, those are the ones, higher secondary, tertiary those are the ones who understand more, but in terms of the older generation, uhh they don't do much, they don't understand much about e-Government. Uhh ... they are more interested in either, making calls, which is the cellphone ... uhh ... cellphone background, which will be through the cellphone calls and stuff.</p> <p>... there is a bit of difficulty in terms of role clarity, which department has to do what. When you find that some of the duties will be handled at another ministry when it should be handled by certain ministry. So until you clarify that, role clarity, people will be in difficulty.</p> <p>Multiple eGov coordinating bodies, eGov chairman, eGov comptroller and Department of Technology</p> <p>Ministries and agencies were grouped together into 'themes' in order to encourage whole of government approach. Within each thematic group of as many as 8 to 14 agencies, one agency was appointed to be the lead. However, many clusters struggled with finding a joint project, and individual agencies and ministries themselves could not put together a project just for their own Ministries. This was in the process of being changed at the time of the investigation</p> <p>the first team that was formed, it was called the Steering Committee ... Then ... telling committee that decision making and all that ... was ... the Ministry of Communication Science and Technology ... So for me, that was the first mistake, because in the first place, e-Government ... it's about government, it's about</p>	BW2 BW1 BW1 Field notes with BW5 Govt documents on eGov organisation BW3

		Processes		<p>making sure that government run efficiently. When you talk government, therefore, the Office of the President was better placed to lead the e-Government where they were and make sure that they can control, or run, bringing other ministries.</p> <p>[on role clarity in government and on the e-Government project]</p> <p>Not clearly, the roles for the teams yes that way, but the roles for the various meetings for the various ministries not clearly, and this is where the danger is, because if roles for the ministries are not clear, then the journey to the whole of government approach is lost.</p> <p>There is no wrong door, any door is the right door. That whole philosophy, that where we coming from this whole thing of all government approach. But if, the instructions to ministries are not clear, because when I came here, I experience that, it's like we didn't know anything about e-Government, and they perceived it differently, so in that way, so no, I don't think it's clear enough.</p>	
		F4 Skills and Competencies	ICT literacy	<p>Then you need a champion, the champion who would sponsor the whole idea. And that sponsor should also be closely be linked these other ones, the below ones. That is the ideal. But in government, through the different political appointees, you find that I either there is a dis-link between the sponsor and the project manager, or there's a dis-link between the executor and the manager.</p> <p>At the time when e-gov came in, it was mostly the top brass, and you find mostly these are the people who have difficulty using eGov services. You find that these people are given a laptop and PC, this two are just there, they are not been used. Because the person does not even have interest in using them.</p> <p>as far as IT is concerned, I would say our officers are skilled. Probably, where we could be having a problem is with the implementing officers, in terms of their IT skills today. ..., because I know that some of them just basic computer skills they don't have.</p> <p>Skills particularly from the ministry side of things. Umm..Leadership. You know, it took a while from 2007, to something like 2008, 2009 for this thing to kick start, but the leadership understood the importance of e-Government, and their pro to go from parliament down... at that time when they understood, the public service themselves, they did not prepare or up their skills in such a way that they will be able to run with this immediately when the decision was made.</p> <p>[on how the Steering and thematic committees are operating]</p> <p>Well, its running okay, but the content is an issue...what must go in there from time to time. We dry out. We're not used to talking. We dry out.</p>	BW1 BW1 BW2 BW3
		F4 Skills and Competencies	Management and leadership	<p>Well, the challenge now is that, because we are at the initial stage of development. First is lack of knowledge, we have the challenge of what it is that has to be done.</p>	BW6

		F4 Skills and Competencies	Change management	<p>At the National and Cluster level, leadership participation is poor. Commitment is lacking, and the committees are often attended by lower-ranked officers.</p> <p>At the cluster level, all the participants only have a very broad picture of what is happening and what is needed. No one has in-depth knowledge.</p> <p>In workshops for project managers, it was observed that project managers were struggling with goals for the project. They were either given goals which were not specific enough, or were given multiple goals without a priority.</p> <p>Also we need to be assisted on the change management aspect, so that we can have the buy-in of other stakeholders. Because that has not actually been done in a structured manner.</p> <p>before you integrate a project you need to know who is affected. If you dont know who is affected, then how are you going to move. If you move, maybe 2-3 automatically will be affected, once you have move maybe too much, the role, Because you have left these other things, these other people, then the person is going to feel ...</p>	<p>BW4</p> <p>Field notes and workshop outputs</p> <p>BW5</p> <p>BW1</p>
		F4 Skills and Competencies	Process design and re-engineering	<p>if all the process are streamlined, it will be much easier to automate the forms, if the processes are still not there yet, not up to standard ... I think there is an issue of commitment, and getting the right people. ... it would work better if each Ministry gives you their processes, then we have a common ground on which of those who go online.</p> <p>most of us are not actually competent enough, to be able to do the E-gov initiative. Capacity building, probably in the, as I see it, in the area of project management, in the area of BPR and managing e-gov as a whole.</p> <p>Then one of the challenges that we have, was the process re-engineering, because we have a number of processes that are delivering a variety of services. But what we now need is that, as we develop the people hub, we need to come out with a process that will lead us to the integration of the services</p> <p>Some initial designs for procurement processes were successfully implemented. However, subsequent designs only existed on paper, and some only addressed localised issues, and did not address underlying problems or take into consideration the end-to-end process.</p>	<p>BW1</p> <p>BW5</p> <p>BW6</p> <p>Document examination, field notes</p>
		F4 Skills and Competencies	Data governance	<p>Home affairs all the departments on the home affairs they should be linked, one the id part, the id, the passport, uhh the payroll, they should be linked because I'm using the same information again.</p>	<p>BW1</p>

		F4 Skills and Competencies	Project management	<p>They need to also ensure that the system that are bought, they talk to each other, rather than have many many systems.</p> <p>So it's project management, making sure that things that should come first they come first. So this is where we are, this is why we have spent a lot of time in meetings and not moving items in the schedule.</p> <p>We need to be assisted in the project management aspect.</p> <p>Yeah one skill which, if I were to concentrate on the project that we are doing on the cluster, we realize we lack the skill of project management</p> <p>There are a number of skills lacking. Project management, how to run a project. There is a lot of theories and frameworks. But people need to be trained "into use", into knowing how to do the work, not for certificates.</p>	BW5 BW3 BW5 BW6 BW4
3.	Unclear value in ICT procurement	F2 Institutional Arrangements	Standards and governance structures	<p>The decisions about ICT and e-Government, they are made by what is called the e-Government board, chaired by the Head of the civil service. That's where decisions are made.</p> <p>Because sometimes the projects in many regions and ministries, is not aligned to the e-Government vision, and therefore we need those checks to make sure, until we are on the same page, regarding that, that's why we would ... then we would de-centralized again.</p> <p>we have the e-Government board, we have the Joint Steering Committee, Joint Steering Committee comprising of the different leaders of those government leaders, we have the technical team chaired by the e-Government Coordinator</p> <p>... it goes through the Department of Technology because, then, as the expert in the field, they have to say okay go on have a go, go ahead, and give their input and everything else, so that when it gets implemented, it's them.</p> <p>That has always been the responsibility of the DIT department ... They didn't monitor it so well, to not to allow ministries to buy indiscriminately. But, they have since decided to tighten the screws, because there was communication to say, any system that needs to be purchased, is to be done through the office of DIT, so that they know what system, and also the maintenance you know, the maintenance cost are quite, is very high, and they need to also ensure that the system that are bought, they talk to each other, rather than have many many systems.</p>	BW3 BW1 BW5

Table 12 Possible contributing factors of e-Government Outcomes (BW)

General ICT literacy in the wider population is another possible inhibitor. The World Bank points out that, while Country BW provides almost universally free primary education, it does not have a skilled workforce. It has an adult literacy rate of better than 65% but still ranks in the lowest 40% on the UN e-Government Survey's Human Capital Index (Qian & Aquaro 2014).

Telecommunications infrastructure in Country BW is ranked slightly below the 50th percentile in the UN e-Government Survey. Connectivity in the private sector appears to be acceptable, if expensive; but within the government, senior government leaders have acknowledged that *the lack of infrastructure* remains an issue. Work is underway to address this, but in the meantime officers have resorted to extraordinary measures, including bringing their own equipment, to access the internet. The lack of physical infrastructure seems to be the primary reason for low or poor connectivity within government in this instance. No mention of the lack of skills was made by informants on this issue.

"...commercial places no problem. I can easily access internet via my cellphones. But for government is a problem ... Even some officers nowadays, they carry their own private modems, so that when the government one is not working they plug in their own modem and continue working."

[BW2, Project Leader and ICT user]

5.2.3.2 Institutional Arrangements

Existing institutional arrangements contributed to mixed outcomes in two ways. Unclear roles for ministries and a complex governance structure for e-Government initiatives made the environment complex for project managers to navigate. Some tasks which seemed more appropriately done by one ministry was sometimes done by another. The thematic clusters that were supposed to push e-Government initiatives comprised as many as 14 different agencies. With such disparate interests, many clusters were not able to find a joint project on which to work. This resulted in delays in implementation, and it was unclear how initiatives which applied to a single ministry could be promoted or implemented within this framework.

Institutional arrangements around procurement were equally complex. There were multiple e-Government coordinating authorities, including an e-Government coordinator, an e-Government comptroller, and Department of Technology. In addition there were inter-ministry committees, one of which was chaired by the Head of Civil Service. Institutional processes seemed to require central coordination in the case of procurement. However, there appeared to be multiple, parallel paths, because multiple systems with the same functionality such as multiple fingerprint identification systems, and multiple geographic information systems were procured. This sub-optimal use of ICT funds was recognised, and at the time of the investigation, the procurement process was in the midst of being strengthened.

5.2.3.3 Organisational Structures and Processes

Organisational structures and processes governing e-Government initiatives were also weak. One leader felt that the initiatives should be more appropriately led by the individual ministries, rather than by the ministry in charge of technology. At the governance level, roles for the teams seemed to be well defined, but leaders of ministries were unclear about what their role was in team meetings, and unclear about the process by which decisions were made. No evidence was found that a process to build a consensus or common understanding of goals and objectives was undertaken.

At the level of individual projects, project sponsors, project managers and project implementers seem to have been cobbled from different groups with disparate political interests. This created misalignments either between the project sponsor and the project manager, or between the project manager and the implementers. This contributed to delayed or non-implementation of the projects.

5.2.3.4 Skills and Competencies

At the time of the investigation capacity building was seen to be an urgent requirement, and a number of consultants were brought in to address this issue. In the course of the investigation, two major themes emerged.

The first related to *leadership and change management competencies*. Some informants pointed to a lack of leadership and commitment. At the same time, senior leaders (BW6, BW4) admitted to a “lack of knowledge... of what it is that has to be done” and that “No one has in-depth knowledge”. It is unclear if the lack of knowledge led to poor leadership participation at the national and cluster levels, where “committees are often attended by lower-ranked officers”.

This lack of direction was also manifested when project managers were sometimes given multiple goals which did not appear sufficiently specific. In one particular instance, a project manager stated as his objectives:

- a) Improving the efficiency and effectiveness of the issuance of mining licences;
- b) Streamlining work processes; and
- c) Providing a one-stop service centre by 2013.

In addition to the substantial overlap between a) and b), no specific measures or targets were specified. The project manager was unclear about why there was a need for a one-stop service centre, and what services should be included in such a centre.

Change management was specifically cited as an area where the government required assistance. One senior leader admitted that there had been no structured process to obtain the buy-in of stakeholders. Project managers cite the lack of commitment of stakeholders to share information or provide the necessary resources for the project. Personnel affected by the changes were not identified early in the process, and no plans were made to assist them in the transition.

One leader noted the lack of time and opportunity for officers to learn new skills for the new environment.

“.....That also, that’s the sign of impatience, from the leadership. Because if they are impatient and they whip, then, there’s very little room to make mistakes and to learn. So, it’s a two way. Because if you come to the table, and say we’re trying to do this and mess up, you’re in for it. So that’s why we’re telling those people, so there’s two way.”

[BW3, Senior Government Leader responsible for e-Government deployment]

The second major theme that emerged was the lack of *project management competencies* within the government. This was cited by all senior leaders, four of the six informants as a critical skills gap. It was also alluded to by a project manager who pointed out that the choice of project manager for a project played a significant part in the success or failure of the project. One leader (BW4) noted that there were numerous theories and frameworks, but “people need to be trained... into knowing how to do the work, not for certificates”.

The lack of other skills was also mentioned as inhibitors to successful implementation. These included:

- 1) *General ICT literacy*. The level of ICT literacy within the civil service was not homogeneous. While one senior leader thought that most of the civil service was sufficiently ICT literate, project managers pointed out that senior managers were given laptops and PCs which were not used. Some officers in the functional operations roles also did not have basic computer skills.
- 2) *Process re-design*. The lack of business process re-engineering skills (BPR) was specifically cited by two senior leaders as a barrier to implementation. A BPR team of about 10 to 12 officers was actually available to the various ministries. At the time of the investigation, the team had achieved some tangible results such as shortened turnaround times for payments to vendors. They were thus assigned to help other ministries. These subsequent efforts, however, were far less successful and they came under heavy criticism. It turned out that the team worked closely

with the line officers for the payments project and spent months on implementation. In subsequent engagements they were given only two weeks to redesign processes for each ministry. Leaders did not appear to understand the process of redesign, and the time and resources needed to change organisational structures and processes as part of the implementation. As a result, many process designs remained paper designs only, and were not accepted or implemented by the relevant stakeholders.

- 3) *Data governance and sharing.* Project managers and leaders pointed to systems which did not share data, and data sharing protocols were not determined as a criterion for procurement. They appeared unaware of their role in establishing such protocols and establishing interoperability criteria as part of the procurement process. The lack of sharing, however, may be complicated by institutional considerations, and may not be due solely to the lack of awareness or ability to implement. The data collected was insufficient to make a certain determination.

In conclusion, the immediate causes of delayed and non-implementation appeared to be the lack of general management and leadership ability to set a clear direction and mobilise the government for the change, and the lack of competent project managers to support leaders. The lack of other skills around ICT literacy, process design and data governance were also possible impediments to implementation in the future, but did not appear to be the immediate cause of the slow progress.

5.2.4 Factors Affecting Skills Development and Retention

Of the environmental factors, social norms towards novelty seem to inhibit skills development. Institutional arrangements around skills development and hiring did not seem to adequately support e-Government endeavours. Performance measures did not appear to be implemented evenly, and it was unclear if they provided personal motivation for skills acquisition. A summary of factors influencing skills development and retention can be found in **Table 13.**

5.2.4.1 Environmental Factors

Funding was not cited as a factor inhibiting skills development. The general literacy rate was assessed as moderate by the World Bank at 65%, although skills for an industrialised economy were less readily available. One informant felt that cultural issues played a role in inhibiting the adoption of new skills.

Theoretical Construct	Possible Factors	Coded informant responses	Informant
Environmental Factors	Social Norms	I think it's also a bit of the cultural aspect ... people who need to wait before they can venture into something, especially when in non-traditional areas.	BW1
Institutional Arrangements	Capacity building framework	No framework existed to match job roles, to e-Government skills requirements on the ground, to training or capacity building programmes.	Field notes and observations
	Framework for hiring, developing and training ICT personnel	As far as I am concerned, I would say our officers are skilled, it's just that probably the deployment of the skills is not properly done ... with the IT is that they are often, all IT officers, they are Department of Technology, and they are the ones that get to say, you go to this ministry, you go to this ministry, you go to this ministry, whereas that ministry do hire for themselves, but as far as IT is concerned, I would say our officers are skilled. So that's why we have split the government data network, and that is why implications on staffing as well ... I can have my own GIT department.	BW2 BW3
Organisational Structures and Processes	Measurements and KPIs	Well for, if you meet the KPIs well, definitely you are rewarded. If you do well, meet KPIs. We have two types for KPIs, we have what is called on-going commitment, on-going commitment is the type of KPI where you are doing something strictly as per your job description, or doing certain description. But we have also what is called key-commitment, where you have to bring innovation, where you have touch other lives, where you have to be more holistic, where the wealth that you create, will improve the well-being of others.	BW3
		[Are there consequences for people who don't meet the KPIs?] Well, I wouldn't want to commit myself.	BW6
		KPIs exist for each department manager, and there are yearly as well as mid-term reviews. If there are gaps in during the mid-term reviews, managers will try to cover the gaps in the remaining term. But nothing major happens if you don't meet the KPIs.	BW4
		The key issue, really, is the monitoring aspect of that indicator. You can have the measures in place, but if you are not monitoring it ...	BW5

Table 13 Possible factors influencing e-Government skills development and retention (BW)

"I think its also a bit of the cultural aspect, ... people who need to wait before they can venture into something, especially when in non-traditional areas... for example, when I grew up, people, especially in bigger village, they didn't like.. if you propose to build a mortuary for example, that is where somebody dies, they will refuse. According to them, if you do that, then ... many of them will die... when people gradually understood the value of such facilities, that is when [they] went [to] do such business. So I think that has translated into everytime when something new comes in people will drag their feet in terms of taking it back."

[BW1, Project Manager]

5.2.4.2 Institutional Arrangements

The current institutional arrangements around skills development and hiring did notadequately support capacity building for e-Government initiatives.

The Central Agency for Human Resources (CAHR) supported the hiring and deployment of manpower across all government agencies. They also ran a college for civil servants and selected training programmes to be provided to civil servants. Training plans were developed at the individual level, approved by supervisors and then sent to a training committee for approval. Each ministry or agency managed their own pool of training funds.

However, the overall process for planning for skills development did not seem to be fully effective for e-Government, as there was *no existing framework to match job roles to skills, and skills to capacity building programmes*. Feedback was sought from the various government ministries as to what training should be provided to their staff. Each ministry then provided a long list of programmes that they thought their staff should attend. The total list across all ministries amounted to several hundred programmes.

The college could not discern the value of the programmes, and could not differentiate between programmes of a similar nature, such as project management courses promoting different frameworks; or process re-engineering courses and business process improvement courses. Other courses such as enterprise architecture, which provided an overarching framework, also overlapped with courses which provided specific expertise. The college was unable to assess how these programmes fit together, who constituted their target audiences, and how such trained personnel might fit into an e-Government implementation programme. Discussions with other stakeholders such as leaders in government ministries and the e-Government coordinator revealed a lack of knowledge about the necessary skills, or conflicting expectations. The attempt at a coordinated capacity building endeavour was thus stalled.

The hiring and deployment of ICT personnel was not coordinated. On the one hand, the Department of Technology hired ICT personnel and assigned them to the various ministries. On the other hand, some ministries also hired ICT personnel on their own, and others expressed the desire to do so. Personnel from these two sources did not always operate under the same units within the ministries, and it was unclear whether and how this hiring process was coordinated between the Department of Technology and the ministries. It was also unclear whether candidates were adequately assessed for skills determined to be missing and needed in government.

5.2.4.3 Organisational Structures and Processes

Over a period of two years, it was observed that various people in management positions were rotated out of their posts, but it was unclear if such rotations were related to performance, development or other reasons. While one senior leader articulated clear details of how performance was going to be managed in his ministry, three other leaders noted that there were no major consequences in the case where performance indicators were not met. Implementation appeared uneven across the government. The lack of performance orientation did not encourage individuals to pick up the necessary skills to do their job well.

5.2.4.4 Other factors

One leader touched on the fact that the government appeared overly dependent on consultants and therefore the skills were not absorbed by the officers in government. Another pointed out that although there was a lot of training, it needed to be geared towards doing the job, rather than on obtaining certification. Both these comments point to the need for real world, on-the-job experience to facilitate skills transfer.

"I think we spent too much money on consultants, even in areas where we should have just brought in a consultant in for one or two three four days, for us to be taught and then we bend our finger and then you come check and just like that. So instead we contain ourselves to just reading. What happens is that, we'll call you, do our processes and you do them, and then from there, you study them and then from there wholesale, we don't do it ourselves."

[BW3, Senior Government Leader responsible for e-Government Deployment]

5.2.5 Summary of Case

The physical ICT infrastructure continued to be inadequate to support e-Government initiatives at the time of the investigation, but was in the process of being improved. However, the primary cause of delayed and non-implementation of ICT systems seemed to be the lack of

in-depth knowledge at the leadership level of what was needed in order to implement e-Government. This lack of knowledge, and the lack capacity to mobilise stakeholders resulted in governance structures, and project organisations that were ineffective. A weak Department of Technology, and multiple coordinating centres lead to parallel ICT procurement paths and duplicate systems.

Leaders highlighted the lack of ability of their staff to perform on the job, despite their certification in skills like project management. For effective skills transfer, and a self-sustaining approach towards the use of technology in government, both leaders and project managers can benefit from on-the-job training. One leader suggested that it was necessary that they do the work themselves, and be guided along the way, rather than to be dependent on consultants to obtain a quick result. However, such an approach requires time, and so it is necessary that leaders provide sufficient time for the organisation to acquire the skills.

Overall, a less ambitious, more targeted approach towards e-Government implementation may have generated better outcomes, and allowed for a development of a core group of experts. These experts would then be able to guide future implementations.

5.3 Case of DN

5.3.1 Background and e-Government Efforts

Country DN provided an opportunity to contrast the implementation of an ICT programme within the statistics office of the central government with another programme managed by the central authority for information and communication technology (CAICT). The two programmes led to widely differing outcomes.

The investigation was carried out after the ICT system in the statistics office had been in use for more than two years, although key informants were present throughout the conception, implementation and transition into operations, and lent insight into the process of enactment.

Country DN has a per capita GDP of about US\$2,000. Under the World Bank classification, it is a lower-middle income country. Its economy is classified as factor driven, and it is largely agrarian, with major exports in grains and seafood. However, its manufacturing base has been growing, and it also produces clothes and shoes for export. The government continues to be a major employer, although many government officials work second or third jobs in their own businesses or in the informal economy. In terms of literacy, DN is in the lower half of countries surveyed by the UN (Qian 2012). Corruption is recognised as a major barrier to doing business, and it is ranked in the lowest third of countries on the Corruptions Perceptions Index by Transparency International. (www.transparency.org).

Country DN is run by a single party, but has multiple levels of government. The national government has approximately 23 different ministries in addition to the central bank. It is divided into approximately 60 provinces which have their own provincial governments.

There has been no established national e-Government master plan, although the use of ICT was, in some instances, incorporated into economic development plans at the national level. A number of projects to use ICT to increase the capability of government have been in progress for at least ten years prior to the time of the investigation. These projects were in most instances funded by IDBs and were initiated at both the national and provincial levels.

In this case, evidence was drawn from two ICT programmes at the national level: one run through the statistics office, another through the central agency responsible for ICT (CAICT) implementation in government. Each programme was divided into multiple projects. This was primarily due to the procurement processes required by the IDB, which divided the objectives of the programme into sub-goals, some of which required different kinds of specialist skills. For example, one project might require the services of a procurement specialist to write the terms

of reference for subsequent purchases. Another might require an infrastructure specialist to design a network and install appropriate equipment. These projects would then be awarded to different contractors.

The statistics office was responsible for, amongst other things, conducting a major population census once every 10 years, with mid-term censuses in between. Other surveys on specific industries, such as fisheries were also conducted on a regular basis. The project within the statistics office was to modernise operations, and to use technology to increase the timeliness and quality of the data collected.

Projects run by the CAICT were less well defined. A number of initiatives were aborted, and those that remained focused primarily on hardware deployment and infrastructure.

5.3.2 State of Implementation

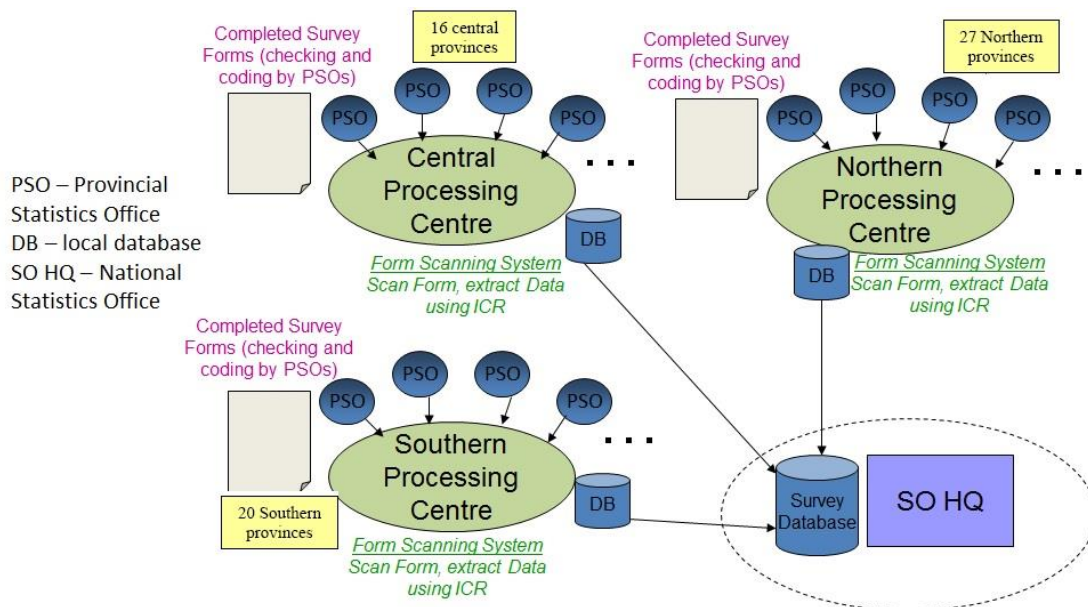


Figure 12 System Schematic (Case of DN-NSO)

At the time of the investigation, key stakeholders indicated that they considered the project implemented by the statistics department a success. However, they were less positive about other projects that were being implemented at about the same time.

Prior to system implementation at the statistics office, census data was collected by enumerators who visited villages, homes and businesses to collect data on paper. These paper documents were then sent to processing centres where the data was transcribed and keyed into computers. The data was then sent by email or electronic files that had to be reintegrated manually at headquarters.

After implementation, the nine processing centres were consolidated into three regional processing centres. Enumerators still collected data primarily on paper and sent them to the processing centres. However, at the processing centres, the paper forms were scanned electronically, and character recognition software converted the written data into electronic form. The data was then transmitted electronically to headquarters through fibre optic cables into a central database. A schematic of the system can be found in **Figure 12**.

State of Implementation	Informant
<p><u>Reduced data collection effort</u> They don't ... do data entry anymore, with the scanning capability, they can actually get enumerators to collect the forms and process the data through the scanning system. And through the web-based system, they can use tablets, get interviewers to fill up and capture data directly. So there's no more transcription part of data.</p>	DN07
<p><u>Increased data accuracy</u> It was much better than the older system because in the old system there were a lot of data entry errors. The accuracy was much higher with the new system. This also reduced the time taken to consolidate and compile the data by up to 40%.</p>	DN08 DN09
<p><u>Increased capacity for analysis and forecasting</u> If you put your data correctly, the business intelligence system will help you generate all the tables for you. So the focus was to get the statisticians to focus more on value adding tools like forecasting rather than report generation.</p>	DN07
<p><u>Reduced turnaround time to produce statistics</u> We have shortened the data collection time by 50%. Prior to the project in 1999, as many as 250,000 people and 9 processing centres were involved in the census, and it took two years to compile and produce the results. After the project, we used about 20,000 enumerator teams and about 900 processing staff in three centres. The time taken to compile the data was reduced to about one year.</p> <p>Three large surveys have since been conducted after the first population census. It takes about 10 months for a full population census, 6 months for a fisheries census and 4 months for a mid-term population census.</p>	DN01 DN08 DN09
<p><u>Delayed or lack of implementation</u> In fact there was another project that I was involved in ... from 2007-2012. The ... project was a failure because they didn't have enough expertise. Although they tried to develop IT expertise, many of them were very technical competencies but on the business side of IT systems and project management the ... project was a failure because they were focused more on buying hardware and servers, not software systems. And in 2007 the prime minister ... declared this project a failure.</p>	DN07
<p>... We have this ISP project, internet connectivity, \$50 million, for five years, nothing.</p>	DN05
<p><u>Unclear value in ICT procurement</u> 20%-40% of the IT investments don't generate worthwhile results. These are primarily focused on the purchase of hardware and equipment. It's like buying a car. Old car, new car, what is the difference? The difference between the successful and not successful projects is whether the process has changed.</p> <p>Then you have to find out how to spend this amount of money. So for example, as you noted correctly for [local] bank, they can use the mother company system, but they got the money, and they have to spend it. So no matter what, the project feasibility study says, whether feasible or not, must spend.</p>	DN01 DN05

Table 14 State of implementation for Case DN

This resulted in the following:

- 1) *Reduced data collection effort and increased accuracy.* Transcription of data was eliminated. Data was either collected directly through electronic devices like tablets, or

paper collection forms were scanned electronically. This in turn led to increased data accuracy.

- 2) *Reduced turnaround time.* The time taken to conduct surveys was reduced by up to 50%, providing more timely data to support decisions.
- 3) *Increased capacity for analysis and forecasting.* Routine reports were now generated automatically. Ad hoc reports could be produced in a shorter period, leaving more time for statisticians to do analysis and forecasting.

However, projects within the programme run by the CAICT were less successful. It was not uncommon to find:

- 1) *Delayed or lack of implementation.* Projects, even when adequately funded, would show no or lacklustre results after five years. Some of these were officially declared failures, others were simply abandoned.
- 2) *Unclear value in ICT procurement.* This was mostly due to a focus on procurement of hardware rather than changes in organisation structures and processes. Multiple projects for data centres with duplicated functions were pursued. A senior leader estimated that 20% to 40% of the investments do not generate meaningful results.

A summary of informants' responses can be found in **Table 14**.

5.3.3 Possible Contributing Factors to the State of Implementation

The Statistics Office Programme

A number of factors contributed to the positive outcomes from the statistics office. Several of the environmental factors often cited as barriers to implementation were not present. The communications infrastructure within the government was good with additional infrastructure built through the project to improve communications to the provinces. The project was adequately funded, with a second tranche of funding provided after progress was shown with the initial tranche.

The project benefited from strong leadership from senior manager of the statistics office, who was responsible for conducting the population census. The project director was senior manager in charge of the operations of the processing centres; someone who was familiar with the use and management of ICT. The staff was motivated, and processing centre staff identified the support of statisticians who were the eventual users of the data as a critical success factor. Together with external experts, detailed plans to: manage procurement, develop data-sharing standards, change processes and train staff were put together.

An overall IT framework and architecture allowed for procurement of different subsystems and components with the minimum of overlap or missing components. Much effort was expended creating standards around data fields, both in form and meaning. This allowed data to be readily consolidated and shared across provinces.

“It was self-initiated and during the feasibility study um they gave their inputs to the consultants for the feasibility study and from there they actually identified three big areas for NSO to start on the modernization program and these three big areas actually really became the basis of their entire procurement plan.”

[DN07, Technical Advisor, DN-NSO]

Data standards were developed and set up across all provinces. Common definitions of data elements were agreed upon, and these standards were used to localise the ICT system that was acquired for NSO.

“Meta-data definition would be useful to share data across provinces. There were no standards before. Now using [local name for data standards] as a standard for terms and definitions across provinces.”

[DN01, Senior Leader, DN-NSO]

While enumerators still collected data on paper, the forms used to collect the data were redesigned to allow them to be processed electronically. This also meant that enumerators had to standardise the writing of numerals, check marks, and use pens instead of pencils. Revised process steps were documented and communicated far in advance of system implementation. Eventually, these standardised processes were used even in surveys that did not involve electronic scanning, which, according to the statisticians, improved data accuracy.

To develop an effective skills development plan, a skills inventory was first established. Training programmes were then conducted to fill the gaps. Gaps in functional skills such as statistics and data analysis were filled through programmes that included training in other countries. Both classroom and on-the-job training was provided to processing centre officers who had to use the new ICT system.

“The [vendor] expert conducted two to three training sessions for us over few months, and after the training we were provided with online support by the expert during the data collection. The [vendor] expert provided support during the first scanning process. After two years, and the first survey was completed, we were able to do the subsequent surveys by ourselves.”

[DN08, DN09, IT processing officers DN-NSO]

	State of Implementation	Theoretical Construct	Possible Contributing Factors	Coded informant responses	Informant
1.	Reduced data collection efforts and increased data accuracy	F1 Environmental Factors	Physical Infrastructure	Technical infrastructure is ok. Network infrastructure especially for government. We have a fibre network connecting all the government ministries. We have fibre connectivity to all rural districts from the central government. Connectivity is good. By fibre.	DN05 DN02
	Reduced turnaround times		Funding	So initially a budget of about USD\$15 million was budgeted for this ICT development project and uh midway during the project because of statistics office success, another USD\$6 million was given but I had to actually write the justification on what were the projects so that this additional USD\$6 million could be given to them.	DN07
	Increased capacity for analysis and forecasting	F2 Institutional Arrangements	ICT Investment and Procurement	So what happened was that when I was engaged they told me that these three huge chunks were impossible to implement because it's very difficult. So what I did was I spent three months with them to do a mini IT planning study ... identified a couple of consultancy projects as well as IT projects and supported by a set of ... training plans. So ... this actually covered the entire ... procurement plan for the statistics office.	DN07
		F4 Skills and Competencies	Project Management, Process Design and Re-engineering and General IT Management	My project director was US trained, the number two man whom I worked very closely with was an expert in IT in VN so they know management issues they know IT issues. But they never had experienced managing a project of such capacity. The first one year is where the project management unit will gain capability in learning how to manage IDB projects, then they will hire consultants to help the project management unit in doing, for example – consultants to do the current state analysis, then consultants even to do consultancy projects like process improvements or even BPR or even IT planning. Then from this consultancy studies then they will identify IT projects and the budgets for the IT projects.	DN07
		F3 Organisational Structures and Processes	Skills development and retention processes	So in this IT assessment there were two parts. The first part was to look at the current state of the IT infrastructure; the second part was to look at the skill sets of statistics office in terms of skill sets for statistics and also IT. And from there we actually had the inventory of the skill sets and also the inventory of the equipment. Come up with a training plan, every training plan has a budget of 30k or 50k, identify the stakeholders, then the statistics office personnel department has to go and work with the project management office to identify courses and the personnel department will identify people on the courses and send them for training.	DN07

		F4 Skills and Competencies	Process Design and Re-engineering	<p>The second dimension of skills was actually statistic skills and that is the part where they actually send their people for study tours and they had study tours to a few countries to see how they did their statistics modernization or statistics capacity building.</p> <p>The training we were provided with online support by the expert during the data collection. The [vendor] expert provided support during the first scanning process. After two years, and the first survey was completed, we were able to do the subsequent surveys by ourselves.</p> <p>In fact, from the business process and strategic viewpoint, top management of statistics office were made to go through the key processes of statistics office and look at how to manage statistics in the most strategic manner.</p> <p>There were no major changes at the provinces as far as their processes are concerned. We introduced revised forms before the system was implemented, and standardized the way characters were written. Detailed instructions on how to use the new forms were issued, including what kind of ticks [v] should be used on the survey form. Roles and responsibilities were written down and distributed. Process steps were also written down and distributed.</p>	DN08, DN09
		F4 Skills and Competencies	Change Management	<p>One of the most important things was that the standardized processes developed for the IT system, was used to improve other non-IT supported processes. Form designs using boxes to separate characters for certain essential data elements made them easier to interpret. We also used to fill in the forms in pencil. In order to use the system, we had to switch to using a ball-point pen. Error correction using correcting tape was much easier. We trialled the new form designs before the system was implemented, and then adjusted the forms when the system was ready.</p>	DN07 DN08, DN09
		F4 Skills and Competencies	Data Governance	<p>Meta-data definition would be useful to share data across provinces. There were no standards before. Now using NDMS as a standard for terms and definitions across provinces.</p>	DN01
		F4 Skills and Competencies	Management and leadership	<p>One of the critical success factors for NSO's project was that you know it's not managed by IT people but it was managed by people who are, who understood statistical practices and people who had IT background.</p> <p>For the statistics office subproject, since statistics office project management unit is directly related to the actual end user, the implementation of statistics office subproject was able to closely meet the requirements of business users.</p>	DN07 DN08,

				The critical success factor was the commitment of the people and the direction of the business users from the National Statistics Office. Detailed guidance was given by the business, and the IT staff at [Statistics IT processing centre] were well-trained to use system.	DN09
2.	Delayed or Lack of Implementation	F1 Environmental Factors	Funding	For planning purposes, all projects have to go through the Ministry of Planning and Investment (MPI). One of the challenges is the limited budget. We sometimes have creative solutions like with the [regional] single window. We partner with the private sector and the Japanese to implement the solution. The private sector will recover the costs of the system over thirty years, but we will have the funds to implement the system now.	DN03
		F2 Institutional Arrangements	ICT Investment and Procurement Practices	The requirement in this decree asks for something technically difficult, especially for the cost norms. The cost norm is very, very low. In order to get enough money to do a system, the project owner has to play around with the number to meet cost norms. A lot of time is spent playing with the cost norms to get the money for the project ... So many CIO in VN is in this situation. A lot of money, but cannot do a feasibility study. Cannot get it done. Project preparation done by the senior management, manager level. These people busy playing try to meet the cost norm, try to adjust the quantity to fit the amount which his boss has negotiated.	DN05
		F2 Institutional Arrangements	Other Institutional Arrangements	The biggest concern seems to be the loss of the operational database. People seem to think that by sending the data to the national database, the operational data will be destroyed. But both databases are needed and they serve a different purpose. The national database is for decision making. The operational database will still be there for the day-to-day transactions. So people leave the meeting. Government agencies don't have a national information architecture. So they cannot say who should capture the data, what data should be captured, who they should share it with and the reason why they should share it. So government agencies do not share data, or if they do share it, the data quality is low, and sometimes they ask for money in exchange for data. But the information that people are willing to share is already public. Information needed for policy making is hard to get. Not only is the information sharing difficult, the protocol for information sharing (digitally) is quite poor. We have international standards for technology, which are popular in VN. They are mostly technical standards. They have a template, project description, project design. But it is very simple, one page A4. It is a formality.	DN03 DN05
		F4 Skills and Competencies	Management and Leadership	From the leader point of view, very scared to approve. The reason is the project preparation is very poor, for the IT project. Usually the IT project, the feasibility study does not properly describe	DN05

		F4 Skills and Competencies	Process Design and Re-engineering	<p>benefits. If the project reaches \$10million, with some lousy feasibility study to give to the boss, then the boss is afraid to approve. That's why IT project hard to get approval.</p> <p>The lack of business accountability for ICT investments did not promote greater understanding of the role these entities played in achieving successful ICT adoption.</p> <p>There are two types of skills. One is in using information technology. The other is in information competency. The government officials are unable to identify what kind of information they need to collect in order for them to do their jobs. They don't know how to go from data to information to knowledge. Knowledge is what drives decision making, but they cannot make that transformation. They need to be able to identify their information needs before the start of an IT project. They can attend a course, say for 5 days, and then be able to use the computer software. But the information skills they need to learn themselves.</p> <p>The biggest difficulty is that the people are unclear about the business workflow, different people have a different understanding of the business workflow.</p> <p>There is a strong need for business process re-engineering and reforming government. I am more worried about the processes. The private sector has made a lot of progress ... There is no competitive pressure in government to make the change.</p> <p>With the exception of infrastructure packages, applications supporting internal operations or delivery public services needed to be designed carefully with a view of streamlining the business processes and information management of the user organisation.</p>	<p>Internal assessment on lack of ICT progress</p> <p>DN02</p> <p>DN02</p> <p>DN03</p> <p>Internal assessment on lack of ICT progress</p>
		F4 Skills and Competencies	Project Management	<p>The biggest challenge is that project management units had very, very little capacity</p> <p>Interdependencies of packages were not clearly grasped by the project teams resulting in some completed packages such as CAICT2-3 and CAICT2-4 not being properly implemented due to cancellation of CAICT2-1 to provide the hosting facilities.</p>	<p>DN07</p> <p>Internal assessment on lack of ICT progress</p>

3.	Unclear value in ICT procurement	F2 Institutional Arrangements	ICT Investment and Procurement Practices	<p>Say I want a software system, I have to write a proposal paper that says what application I want, why I want it and how much budget. Must be tentatively agreed by the Minister level. Minister compiles this into a Ministry financial plan submitted to MPI (Ministry of Planning and Investment) for approval. MPI is the one who will review and approve the project. Once approved, it comes back to the project owner. The project owner needs to develop a feasibility study document, submit to the Ministry level approval, then the project can proceed.</p> <p>The other problem is the dependence on personal relationships in order to get project approval. For example, my boss' relationship is good with MPI, MOF, good relationship with the Minister, you can get approval. The proposal very short, I need this money, blah blah blah, ok. If your relationship is good you will get this amount of money.</p> <p>CAICT subproject is the organisation that has the most complex organisation structure where CAICT PMU[project management unit] is solely responsible for procurement and project administration. Beside CAICT PMU, there are 3 implementation committees who are responsible for the project requirements: CAICT1 is led by Department of IT Application Agency of CAICT, CAICT2 is led by Information Center of CAICT and CAICT3 is led by Department of IT of CAICT. This organisation structure proved to be very challenging to CAICT PMU in terms of coordination between the different stakeholders. The procurement process took longer as every package needed to involve various departments of CAICT.</p> <p>The role of CAICT in e-Government development in the capital is still confined to the more popular public services for the citizen while businesses services are outside the purview of CAICT. That is one of the reasons that caused sub-project for the capital to downsize the scope of its project from 36 Million USD at the beginning to eventually 8 Million USD with only 4 packages implemented.</p> <p>Project integration and levels of ICT decision authority on national, city/provincial and agencies were not clearly spelled out in the overall project governance framework leading to multiple architectures and common infrastructure such as data centres being pursued by all three subprojects i.e. duplication.</p>	<p>DN05</p> <p>DN05</p> <p>DN07</p> <p>DN07</p> <p>Internal assessment on lack of ICT progress</p>
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Table 15 Possible contributing factors of e-Government Outcomes (DN)

Of course, no project is without problems, and initial issues included officers being unable to operate the ICT system, and stricter requirements around paper documents.

“In the early days, some of the first survey forms were too dirty. They suffered from water damage during transport from the provinces to the processing centre. These forms could not be processed by the automated system. Initially, the data from damaged forms were keyed in manually through a keyboard. However, to preserve the integrity of the data, it was later decided to ask that the forms be recompleted and resubmitted, so that they could be scanned in their original form.”

[DN09, IT processing officer DN-NSO]

Programme managed by CAICT

In contrast, projects run by the CAICT were plagued with a variety of issues, starting with unclear objectives. This was possibly caused by the initiatives not being managed by the leaders of the functional units in government, but were seen as something run out of CAICT.

Budgeting and procurement processes were complicated and dependent on personal relationships. Funds were approved for projects ahead of a proper feasibility study and business case. However, funding was inadequate in many instances, not because the funds were not set aside, but because CAICT officers could not mobilise the funds. Institutional arrangements placed limits on how much could be spent per project, and much effort was devoted to breaking up projects into smaller sub-projects to fit these limits. Officers also did not have the skills to put up a sound business case to justify large enterprise-wide projects, and so senior leaders were reluctant to approve such projects.

“The other problem is the dependence on personal relationships in order to get project approval. For example, my boss’ relationship is good with MPI, MOF, good relationship with the Minister, you can get approval. The proposal very short, I need this money, blah blah blah, ok. If your relationship is good you will get this amount of money.”

[DN05, Project Manager in CAICT]

While laws have been passed to facilitate, and even require, information sharing across institutional boundaries, this has not been the practice. Officers in agencies and provincial governments appear concerned that if information is shared at the national level, they will lose control of the data. Frequently, only publicly available data is shared among government agencies. Some officers go to the extent of demanding payment in exchange for information.

Other factors cited included the lack of leadership and accountability from functional agencies. Functional agencies sometimes did not appear to be competent in their functional areas, especially in the area of data analysis in support of policy making.

Skills around process redesign were found to be in short supply. As a result, projects often did not involve process changes, but were focused on acquisition of hardware and software. One leader noted that the private sector was more advanced in process change for technology adoption, but there did not seem to be sufficient motivation or competitive pressure in the government sector to do the same.

Programme management across projects was poor. Dependencies between projects were not understood, with projects abandoned without consideration for downstream implications. Duplication also occurred between projects.

The net result of all these factors was that many projects were aborted, and less than one third of funds allocated for the implementation of ICT was used. An internal assessment found that few projects resulted in improved functional outcomes for the government.

A summary of the possible contributing factors to the state of implementation and the associated informant responses can be found in **Table 15**.

5.3.4 Factors Affecting Skills Development and Retention

Skills development and retention in general

Institutional arrangements around capacity building in general, and around the development and deployment of ICT personnel appeared underdeveloped. There is no consistently implemented structured skills development plan. Aside from some training on the structure of government, each agency is responsible for training and developing their staff, and so the effectiveness of such training varies from agency to agency. While some standards in terms of training hours were established, agencies did not often adhere to them.

In the case of ICT personnel, a recent trend towards the procurement of ICT services from private sector vendors has put some uncertainty into their roles. No mention of requisite skills in vendor and contract management were made by government officials, and no structured programme has been put in place for officers to develop these new skills. Government leaders appear to place less importance on project management, or lack understanding on its role in e-Government implementation.

		<p>regulations better? We need to use measures that support business investment. Until recently, the Ministry of Finance used lines of code written to assess the productivity of IT staff. This makes it so that IT employees then write many short lines of code so that they can meet the KPI. They should use something that measures the impact to the business. So while KPIs are a good idea, they are not well implemented in VN, and the government agencies don't have KPIs.</p> <p>There are no clear measurements or staff appraisal. KPIs (key performance indicators) are easy for service and front office staff. But for regulation, policy, strategy and back office, it is not so easy. So you get KPIs like the number of decrees drafted.</p>	DN05
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Table 16 Possible factors influencing e-Government skills development and retention (DN)

Organisational processes around appointments of personnel and performance measurement were also weak. No central human resources agency existed to establish and maintain standards across government. There did not seem to be a structured, transparent process by which staff members were appointed, and reasons for various appointments were not always clear. Roles and responsibilities were not always congruent across government agencies.

While there was some concept of performance measurement, key performance indicators appeared to be activity oriented: focusing on number of lines of code, or number of pieces of legislation drafted; rather than on organisational or policy outcomes. Non-performers were given meaningless posts, but were not removed from the government.

Skills development specific to the statistics office programme

Even within the statistics office, no formal skills development plan was in place before the project. A plan was only developed through the project.

A mix of internal and external skills was used in the project. Skills development was treated as a core part of project implementation, and focused not only on ICT skills but also on the core skills necessary for statistics in understanding and manipulating data. While key internal staff members were considered ICT experts in VN, they did not have the experience in managing large-scale projects, and external experts were called in to assist.

Extensive effort was put into providing statisticians and processing centre officers with the functional skills necessary to operate the ICT system, including both classroom and on-the-job training and support. The fact that the officers were able to conduct two additional surveys independently after the initial census demonstrated that these skills had been effectively transferred and retained by them.

However, there is less evidence that the skills necessary to implement a project of a similar size and scope were transferred and retained by the organisation. This was because the work surrounding procurement, project management, process design and change management was done primarily by external experts. These experts then left the organisation at the end of the project. No candidates were identified to be groomed as specialists in this area, and it is unclear if institutional arrangements would allow such persons to work on other projects in other parts of government.

A summary of the possible contributing factors to the development and retention of skills in Country DN and the associated informant responses can be found in **Table 16**.

5.3.5 Summary of Case

County DN was a case that provided a contrast between a programme that generated substantial results in terms of increased organisational capability and one which provided limited benefits.

Environmental factors such as physical infrastructure within the government, funding, and technological maturity were shared across both programmes. However, institutional arrangements and organisational structures, especially those surrounding project leadership and procurement differed significantly. Functional leadership in the programme run by the statistics office allowed for desired benefits to be clearly identified, and funds were allocated after a detailed study into overall programme needs. In contrast, the CAICT programme suffered from unclear objectives, and a complex funding process that allocated funds before detailed feasibility studies were conducted. Institutional arrangements appeared to hamper information sharing. However, it is unclear whether projects reached a state where they were held back by this factor.

Skills in process redesign, change management, project management, and procurement played a significant role in achieving the objectives of the statistics office programme. The requisite skills were acquired through a mix of internal and external experts. Additional skills in operating the functional ICT system were developed through structured classroom and on-the-job programmes as part of the project. In contrast, the lack of process redesign skills, project management skills, and the ability to evaluate benefits and develop detailed feasibility studies contributed to stalled projects, duplication, and unclear benefits from the CAICT programme.

Across the government, institutional practices around staff appointments, performance management and skills development were either weak, absent or not practiced consistently. While functional ICT skills in the statistics office appear to have been developed and retained, it is less clear if other skills necessary for e-Government implementation were developed and retained. Even if such skills were developed and retained, it remains unclear if institutional arrangements would allow these skills to be reapplied in other parts of the government.

5.4 Case of SL

5.4.1 Background and e-Government Efforts

In Country SL, preparations were underway to implement an ICT system in the government tax and revenue collection agency (TRCA). As part of this process government officers were sent on two training programmes at an overseas university to better understand e-Government. The investigator was engaged to provide some of the training. The investigation was carried out in a separate but parallel track to the training programmes. Some observations and field notes on work done by the participants were included as part of the evidence.

Country SL is classified as a lower-middle income country by the World Bank, with a per capita GDP of more than US\$3,000. Its economy is classified to be in Stage 2 (efficiency-driven) by the World Economic Forum, with textile and clothing manufacture as an important industry. Commodities such as coffee, tea, and rubber are important exports, but remittances from nationals working abroad remain an important source of foreign income. Many government initiatives are funded through IDBs and other international agencies, to the extent that the practice has been institutionalised, with a dedicated unit set up for securing and managing funds from external agencies. Literacy is generally high, and Country SL ranks in the top 40% of countries on the human capital index for e-Government (Qian 2012). It is ranked in the top half of countries on the Corruptions Perceptions Index by Transparency International. (www.transparency.org).

Country SL is a multi-party democracy, with an elected parliament, and an executive President who is directly elected. It is divided into nine provinces with their own administrations, and more than 250 districts within the provinces.

An e-Government master plan was conceived in 2002 and resulted in a number of successful implementations, most notably in the area of pensions, driving licences, passports and visas. Some connectivity to the internet for rural populations was also provided through internet kiosks. However, efforts in the area of financial management had had mixed results. Some success was achieved in digitised data collection for expenditures, but an integrated budget and expenditure system had eluded the Ministry of Finance. In an effort to enhance revenue collection and manage public funds effectively, the Ministry of Finance set up a programme to implement two systems: a Financial Management System (FMS) meant to automate budgetary and expenditure processes, and key departments of the Ministry of Finance; and a revenue collection information system (TRCA IS), to automate revenue collection processes within TRCA and the excise departments.

The TRCA was an agency under the Ministry of Finance (MoF). It, together with an agency which collected excise taxes, was the major revenue collection agency for the government of SL. In support of the impending implementation of these systems, the government sent officers of the Ministry of Finance, TRCA, and the excise department for training courses “aimed at building their necessary skill and mind sets, and capacities at every level” (government capacity building document).

5.4.2 State of Implementation

At the time of the investigation, the TRCA was divided into more than 20 different units. Some units were focused on particular taxes, amongst which were value-added taxes, betting taxes, stamp duties, corporate taxes, and nation-building taxes. Other units focused on targeted segments of the taxpayer population such as large taxpayers, or the more general taxpayer. Support units for legal work, investigations and appeals, and economic research, and information technology added to the complexity. In addition, there were a number of regional offices serving the various provinces.

The conception of an integrated system in support of revenue collection had been around for several years. Data within the TRCA was almost completely stored on individual paper files, which filled rooms with floor to ceiling shelves, and which were often incomplete, and sometimes misplaced. It was difficult to obtain aggregate or management information, and retrieval of individual case particulars could take some time. Part of the goal of the TRCA IS was to digitise this information.

Some personal computers and a network had been installed, but it was unclear the extent to which they were utilised for the purposes of administering taxes. Typewriters were still in use in some locations, and older, and therefore those more senior in the hierarchy were not familiar with, or not willing to use computers. The general strategy towards changing this environment was to introduce computers to younger people and to wait until older officers retired and left the organisation.

“... they’ll be reluctant to use so what most of the government organisations do is they prepare separate schemes. And this scheme is driver scheme, and when these people retire this scheme can be the next level ... What they have done is all people are there, they are like the supervisors. The system usage they give it to the new people the new people will move and move and they will be a uh ... the next level of senior people. They tenure 12 to 15 [years] and then the changes is automatically applied.”

[SL5, Vendor project manager for government projects]

In order to prepare the staff for the implementation of the project, two overseas training programmes were organised for about 250 senior staff members and selected personnel. The most senior leaders and selected personnel attended one programme which included topics such as tax policy, management strategy and e-Government. In the other programme, participants were divided into groups of about 20 persons each. The programme would ostensibly cover areas such as e-Government, project management, enterprise architecture, change management and outsourcing; all within a span of five days. Course designers suggested, at the inception, that it might be more effective to identify specialist roles, and have specific groups participate in specific topics areas. However, they were informed that having different content for different groups would be untenable, and would cause dissatisfaction amongst the staff members.

In parallel with the training programme, work progressed on the procurement process for the new TRCA IS system. A request for proposals was made, and various vendors responded. However, by the end of the period set aside for data collection, the following outcomes were observed within TRCA and the Ministry of Finance:

- 1) *Unclear value in IT procurement.* Different procurement practices by various units have sometimes led to less than efficient outcomes. In the limited ICT implementation that existed, most procurement focused on hardware. In this area, there were instances where different prices were paid for the same product.

“Like let’s say we bid for laptops, two laptops. So this bidder bids X amount of price and we buy at the lowest and let’s say that they buy the same thing at a different price, a higher price.”

[SL3, Government Project Leader]

- 2) *Delay in implementation of systems.* By the time data collection had ended, the evaluation of the vendor proposals for TRCA IS had been completed. However, no contract was awarded as the vendor selected by the Government of SL was unable to fulfil one of the conditions of the IDB funding the project.

5.4.3 Possible Contributing Factors to the State of Implementation

Environmental factors such as physical infrastructure and lack of funding did not appear to contribute to delays in implementation, although the uneven adoption of ICT technology and absence of some foundation databases like identity and land titles may possibly impact the implementation in the future.

	State of Implementation	Theoretical Construct	Possible Contributing Factors	Coded informant responses	Informant
1.	Unclear value in IT Procurement	F2 Institutional Arrangements	Standards and governance structures	<p>... CAICT, but that is one problem I believe because there is one special line ministry, Information Technology comes under that ministry so they are responsible for implementing the e-governance policy, but in the meantime there is CAICT. CAICT is headed by the most prominent government officer, so overlapping because that functions ...</p> <p>On the other hand that minister he is a very genuine person, but since the president secretary has such a dominant role, that is the thing. There is no conflict, but you know that if all the IT facilitating agencies come under one housing or under one ministry it would be easier.</p> <p>That- that is not happening. Because ... there are some departments that approach them, approach CAICT their staff do to this – automate our system so then CAICT, I believe they are the focal agency they must tell them okay you have do this this way. Have to do some standard, guidelines to do that and get this agency to do on their own, but then they are telling them okay we will send this person he will do this study. So for them certain agencies they don't like. So then some agencies do automation with CAICT some say no no we will do it our own way.</p> <p>The CAICT, CAICT especially they propose the ministry, let's do this lets do this. This will be work. Sometimes the ministries come up with ideas that they propose. In our case the finance ministry, I think it is our own idea. It's a Tax Administration environment system. So there is no interaction, there is no direct interaction from CAICT, but if you take the pension, e-pension project it was initiated by CAICT to the pension department. It depends, it depends.</p> <p>[On whether CAICT is involved in procurement] No because if it's alone and if it's a separate project you have to follow the IDB guidelines particular to that contract.</p>	SL11 SL1 SL9 SL3
2.	Delayed or Lack of Implementation	F1 Environmental Factors F2 Institutional Arrangements	Working Database ICT Investment and Procurement Practices	<p>Securing data on land titles from appropriate authority is difficult, and takes a lot of time. Land titles office not computerised.</p> <p>Yes because we should know, we should know if, I mean there should be a profile. A unique identification number and profile are the most important things on this</p> <p>So the project proposal will be evaluated under this department NPD, for their feasibilities, so in line of national priorities it will be different projects ... Thereafter, if it is to be funded by local funding after that the line ministry is required to take it up with the national budget department to have with national budget. So other than that if National Planning Department</p>	Field notes from class interactions SL2 SL11

				<p>decided to have the project funded by foreign financing the proposal will reach to our department [ERD] There might be some times where project proposal is completed by line ministry and the might have initiated some communication directly with some foreign financing agency ... So there is a proponent. So the line ministry they negotiate the proponent will be backed by a foreign bank ... the line ministry will indicate to the National Planning Department that we have this project and this bank, one bank is in agreement to finance it. Once the NPD clears that, the line ministry will submit the cabinet memorandum before the cabinet. Once with the cabinet memorandum ... to award the commercial contract. In the meantime they seek to approve director general ERD, our department, to initiate the law negotiations. So based on that clearance, the cabinet approval, we initiate the law clearance process. Law negotiations. So we communicate with the bank and sometimes we inform them of the laws, because these laws are not concessional enough. So after that once the law [once the negotiations ...] we negotiate serveral terms, we submit several cabinet members to cabinet board to sit there to sign the loan agreement. Once they approve. Once this is approved we have to obtain several clearances. Attorney General's and finalise the document</p> <p>We have to follow the IDB procurement guidelines and then on top of that we have to follow government procurement guidelines.</p> <p>Sometimes, the technical evaluation report, IDB stops there. We have to go to a tender board, we have to go to a procurement committee. But IDB says give us the technical report and we will approve it, but if there are changes to that and if you have got the approval from the procurement committee earlier you will have had to go back and say look ADB asked us to change this. So we have clashes all the way and from that we have to put it to cabinet above a certain limit. So IDB guidelines doesn't say anything about that. So the cabinet can always overrule some of the IDBs procurements. If there is a clash, but it's a loan, we still have to abide by the contract. So procurement has been a bit of an issue, big issue.</p> <p>So we have probably overcome most of the barriers because one is the attitude and the other is that the tax office is so, it's unionized and it's like a cartel you can't get in there and do what you ... what we want</p> <p>The only issue in e-Government sometimes people changing their behavior is a very difficult task because you know the government area can earn some money in different ways so then behaviors changing is sometimes difficult- then it will be resistance is very high.</p> <p>The roles are there, but only in our political ... issue changing these ministries roles not very often, but once every year we create a ministry or we merge so ... But major ministries, for so</p>	
		F2 Institutional Arrangements	Other Institutional Arrangements		SL3
		F3 Organisational Structures and Processes	Roles and Role Clarity		SL3 SL5 SL1

		F4 Skills and Competencies	ICT Literacy	<p>many years, they do not change, like the ministry of Finance or Customs. These ministries they are key areas that change, but then simply shift to another ministry.</p> <p>And my answer maybe yes and no. Some ministries they are very defined and others are still in the dark. They are not defining anything clearly. So yes and no.</p> <p>Senior people are able to change, but perhaps a bit uncomfortable. Middle layers open to change, use computers such as email, reading the news, surfing the internet. But do not log in to intranet even though many announcements and information are published on the intranet. The younger people already come with skills, and they are equipped from school.</p> <p>Users, older ones, somehow they are not willing to change. They are comfortable.</p> <p>In terms of IT [literacy] it's still low level. So it needs to be increased. So that is a main challenge. But you know that IT has been included in school curriculum, so there are definitely, there would be some kind of development in that aspect in the future.</p>	SL10 SL12
		F4 Skills and Competencies	Management and Leadership	<p>No, the main thing ... automation customs automation projects all of these 8 or 10 people initially we made the- This not our ... eight project this is the project of the department. Ownership should be go to the particular department. If you are trying to put whatever even the best system, try to put it ... people will not accept.</p> <p>I mean, who is responsible for the sector, I would say, and then coming from the politicians, therefore I think according to my understanding the politicians and the policy makers get together, and decide the priorities of the country. There are here and there, there are these talks going on and then at the national point of view I don't think that we have understood the clear needs of the country.</p> <p>Okay when the IDB comes in, yes e-Government is a priority. We are going to automate this ministry, we are going to automate this, but there's no, you know.... there's no plan. [Other country] you have a twenty or thirty year plan, but all this e-Government projects are done, you know, really in an ad hoc manner. So I see that as ... But the priority is there. I wouldn't necessarily call it a priority, but the government believes in automating, but they believe sometimes they believe automation is just creating a website.</p> <p>[On data sharing across agencies] That is an issue at the moment because no one knows who is going to be the leader. That depends on the Minister, how powerful the Minister. Some time back the Trade Ministry was</p>	SL1 SL10 SL3 SL1

		F4 Skills and Competencies	Process Design and Re-engineering	<p>handling it, when the Trade Minister was very powerful. Again once the Minister changes then ...</p> <p>The first thing we say is a big issue is the business process in engineering ... So we learn in two different classes and get senior's experience in the BPR, but what I see in e-Government, BPR do we have a real structure? Do we have a correct knowledge to do the BPR. So that is, I have still doubt, because different domain experts, everybody has a part waiting for when we do the BPR.</p>	SL5
		F4 Skills and Competencies	Change Management	<p>First big challenge would be changing the mindset of the people, especially the bureaucrats and also some policy makers... some of them, they have not been, have not been convinced that there is a need for change.</p> <p>[On challenges to implementation] The other things are applicable for any project. Therefore change management issues.</p>	SL10 SL1
		F4 Skills and Competencies	Procurement Skills	<p>They don't like to change. Even if you change their position of where they sit, they don't like that. So if you take them from here to there So they refuse that. And if you take a printer, if someone else's printer, if you share this printer. They won't let you do.</p> <p>Compatibility problems within the government, different versions of software being used so files not compatible.</p> <p>If there is a place that we need assistance, it is in technical assessment, and in experience sharing. What works and what doesn't work in other countries, and how we can avoid these hurdles.</p> <p>The main thing is technology for the Inland Revenue. What is the software that they are going to use for this.</p> <p>But already in the specifications, preparations, what I feel, the government they are very lack. Because they don't know how to prepare the specifications, especially the software, but hardware they can do it.</p> <p>[on skilled staff]</p>	SL9 SL12 SL8 SL1 SL5 SL1

The primary contributing factor to the state of implementation at the time of the investigation appeared to be the institutional arrangements surrounding procurement and changes in work processes, which were complicated by conflicting stakeholder interests. Also, leaders did not appear to understand their role in enacting change.

Skills gaps in leadership, change management, process design, ICT literacy, technology management and technical skills were all cited by informants as challenges to implementation. Lack of leadership and change management skills seem to inhibit the changes to the organisation structures and processes and so allow for clearer specification of ICT needs. However, procurement of the TRCA IS had already progressed without this clearer specification, and there is no strong evidence that such gaps caused delays in implementation.

A summary of possible contributing factors to the state of implementation can be found in **Table 17**.

5.4.3.1 Environmental Factors

Country SL enjoyed a high literacy rate, and informants did not cite connectivity or physical infrastructure as a constraint in e-Government implementation. Funding for e-Government projects did not seem to be an issue, and in particular the TRCA IS system. While it was unclear if the government had sufficient funds for such initiatives, government officials were confident that such funds would be made available through “development partners”, that is IDBs and donor agencies.

However, ICT adoption across the government was uneven, and it was unclear that established strategies had resulted in consistent implementation or sequencing of projects. In the context of the TRCA, the lack of a means of identifying taxpayers uniquely and consistently was cited as a factor inhibiting the work of the tax authority. In addition, tax assessors were often required to obtain information on land and real property ownership. However, the authority in charge of land titles did not yet have a working electronic database, and so critical information could not still be obtained quickly. These factors are likely to impact the effectiveness and eventual outcome of TRCA IS.

5.4.3.2 Institutional Arrangements

Institutional arrangements appear to be the biggest inhibitor of e-Government implementation. They affected the adoption of e-Government in two major areas: complex procurement processes delayed the acquisition of technology, and entrenched stakeholders prevented the necessary process changes from taking place.

Because funding for e-Government projects often came from IDBs or donor agencies, budgeting and procurement processes were extremely complex, with project managers having to satisfy both internal and external stakeholders. In the case of the TRCA IS, the vendor selected by the government could not meet one of the requirements of the IDB funding the project, which halted the procurement process after it had moved to fairly advanced stages. Alternate funding models then had to be sought and developed before the project could proceed.

“Sometimes, the technical evaluation report, IDB stops there. We have to go to a tender board, we have to go to a procurement committee. But IDB says give us the technical report and we will approve it, but if there are changes to that and if you have got the approval from the procurement committee earlier you will have had to go back and say look IDB asked us to change this. So we have clashes all the way and from that we have to put it to cabinet above a certain limit. So IDB guidelines doesn’t say anything about that. So the cabinet can always overrule some of the IDBs procurements. If there is a clash, but it’s a loan, we still have to abide by the contract. So procurement has been a bit of an issue, big issue.”

[SL3, Government Project Leader]

However, the most important factor appeared to be the unions of government employees within the TRCA, which did not agree to changes in processes and the kinds of work that were required with the adoption of ICT. Some senior leaders within the TRCA were also members of unions, and it was unclear whether and where a distinction was made between management and labour. In addition, some unions had close associations with political parties. One informant suggested that the resistance was also to protect current institutional practices which allowed for sources of income other than the government salary.

“... the tax office is so, it’s unionized and it’s like a cartel you can’t get in there and do what you- what we want.”

[SL3, Government Project Leader]

“The only issue in e-Government sometimes people changing their behaviour is a very difficult task because you know the government area can earn some money in different ways so then behaviours changing is sometimes difficult- then it will be resistance is very high.”

[SL5, Vendor project manager for government projects]

There also appears to be at least two institutions in charge of e-Government, one the CAICT, and another an unrelated ministry. It is unclear how the two agencies distinguish their roles, and the leader of TRCA, while aware of the existence of CAICT, was unable to name the entity. The CAICT also appeared to have uneven influence in the government, with some ministries cooperating on projects and others shunning them. It was not involved in any significant way in the TRCA IS project. Perhaps because of this, coordination, information sharing

on product pricing, and enforcement of ICT standards across the government did not appear to take place. In some instances, this resulted in sub-optimal procurement outcomes.

5.4.3.3 Organisational Structures and Processes

Organisational structures appear to be unstable across the government with new ministries created or old ministries merged, according to one informant, on a yearly basis. While large and important ministries like the Ministry of Finance, which oversees the TRCA, is generally stable, parts of the organisation may be allocated to other ministries, or other government units absorbed into the ministry. It is unclear whether and how this affected e-Government implementation outcomes.

5.4.3.4 Skills and Competencies

There appeared to be significant gaps in leadership and strategy. While there was ostensibly an e-Government master plan, project leaders and managers at the working level found that there was no coherent strategy, and described implementation as ad hoc and with unclear goals. One informant suggested that leaders did not understand the need for organisational change, and viewed automation as merely putting up a website. A senior government leader responsible for e-Government implementation noted that functional leaders did not want to take ownership of e-Government projects. TRCA leaders noted the need for change management, but did not see their role in making the change, instead expecting vendors and external experts to enact the change for them.

ICT literacy appeared to be mixed, with younger and more junior officers being more comfortable with computing devices. As noted earlier, there were no concerted attempts to reskill older officers, with the idea that they would, in time, retire and that current cohorts of younger officers would automatically make the change towards ICT adoption.

Middle managers did not understand process design, process management and management in general. An external vendor project manager tasked to redesign processes noted that domain experts were unwilling to suggest changes. During class exercises, a number of participants were unable to demonstrate links between problems, causes and solutions. As an example, to solve the problem of under collection of taxes, many participants called for greater awareness programmes for corporations and other potential taxpayers. However, no evidence was put forward that low awareness was in fact the cause of under collection of taxes. It is unclear, however, to what extent these logic gaps appeared only because of the need to protect current institutional practices.

Technology management and technical skills seemed to be short supply. In particular, skills necessary for procurement, such as the ability to make technical assessments and to specify requirements for software were cited as hurdles to successful implementation. Until recently, there was no scheme of service to hire IT professionals. Many IT positions were filled by younger officers from the accounting service. With the establishment of the new ICT service, the number of IT professionals has increased; however, multiple informants note the lack of expertise in this area within the government.

Lack of leadership and change management skills seem to inhibit the changes to the organisation structures and processes and so allow for clearer specification of ICT needs. However, it was too early in the process of enactment to determine whether and how these gaps, together with the gaps in technical skills would impact the eventual outcome of the TRCA IS implementation.

5.4.4 Factors Affecting Skills Development and Retention

Environmental factors such as literacy and funding did not appear to be a major factor inhibiting skills development and retention. However, a large number of citizens work in other countries, which may mean that a number of skilled citizens may be unavailable to the government. Wage gaps between the government and private sector appeared to hinder retention of skilled ICT staff. Organisational practices where officers selected for leadership positions and training opportunities are not selected on the basis of performance or potential do not appear to support or motivate officers to develop individual skills. A summary of factors influencing skills development and retention can be found in **Table 18**.

5.4.4.1 Environmental Factors

Environmental factors did not appear to be a major factor inhibiting skills development and retention in government. Literacy levels were high, and funding for skills development appeared to be easily obtained from IDBs. However, the general reliance on remittances may indicate that some fraction of skilled citizenry would be unavailable to the country as a whole, and as a consequence unavailable to the government.

Theoretical Construct	Possible Factors	Coded informant responses	Informant
Institutional Arrangements	Framework for hiring, deploying and training ICT personnel	Special officers were trained to execute their duties. So these were enforced, not only divisional secretariats, but even in line ministries divisional secretariats, provincial councils, provincial ministries, identified groups of officials to train. Commonly they were known as Chief Innovative Officers.	SL11
		they appointed CIO and other this initiative is taken from the government area is ... Previously we don't have a government IT service so the IT department is handled by ... Accounting Service, so accountants or different senior people in different areas, not the IT. So they appoint a director level, the structure, put in the government IT service. So at the moment, if I remember correctly, there are 3500 service IT employees that are working all the government sector, starting from the director to higher level. The director, senior level. They have structure, the promotion structure, confirmation, all this...	SL5
Organisational Structures and Processes	Measurements and KPIs	Yes government sector is very difficult with salary then for example private sector very good IT person you get about, in our currency, about 300 thousand or so there are people maybe 100 thousand to 300 thousand.	SL1
		At the beginning of the year KPIs for departments are set, but if they fail to meet them, they are asked to explain – Our internet audit may say – you are supposed to be here, but you are not yet there – then they have to explain. But there is no punishment.	SL5
		Roles are generally well defined. People have KPIs. [However, unable to articulate his own KPIs when asked] Runs help desk in support of 2200 users. Unable to articulate service levels or response times.	Interview notes, SL8
		Actually we don't have proper performance evaluation system for public sector officials. We have a system like fill in format, submit annually, like that. It is not a key performance evaluation system. It is just a piece of paper, you know, it doesn't make any sense. No way we evaluate our public sector employees performance, in real terms.	SL10
		So when it comes to the performance appraisals most of the staff officials have to have to come up with, fulfil some sort of rigorous requirement when it comes to performance appraisals...but it is not seen serious and meticulous ... but we have to fill a lengthy form, an appraisal form. In certain departments ... the head maintains a high level of meeting up with that appraisal. So as an example my previous boss ... his standards were very high. So therefore we had to work hard, but not only that, all of the things we did would be reflected on that appraisal form. So there are the key indicators, goals, objectives, whether we made them, all the things were there. But this was applied only to certain departments.	SL11
		[On existence of performance standards] There are, but there are no staff evaluations... not in the government. You can never sack them.	SL3

	Appointment of personnel	<p>... let's say they are next in line to be the head, it is based on seniority. Not on performance.</p> <p>So you start in the grade 3 or class 3 and you have to pass an examination, some exams you have to pass and then you have to wait some period for the getting the experience, then you are eligible for the next class. It's like that. So that structure is well defined, because we have two regulations ... All these things the HR practices are there, the only issue is these are very old. It has to be reviewed.</p>	SL3
	Skills development and retention processes	<p>I would say first thing is to, give some training for selected people, not for all. You have to select them. The development part, or the donor, or someone who is coming to help us, they have to select them. Not the government, not our government. Because the government sometimes there are maybe favouritism. They too biased, sometimes.</p>	SL5
			SL9

Table 18 Possible factors influencing e-Government skills development and retention (SL)

“...the main income source is expatriate income, which means people are, working outside, with 6 billion U.S. dollars and only be earned from expatriate income from people that work overseas, maybe doctors and engineers, you know, working in developed countries. And some people, unskilled labour working in these countries.”

[SL1, Senior leader in Ministry of Finance]

5.4.4.2 Institutional Arrangements

Institutional arrangements relating to terms of employment did not seem conducive to the development and retention of skilled ICT employees. Until recently, there was no career development path or scheme of employment for ICT staff. While the numbers of ICT staff seemed to have improved within the government, a wage gap existed between the government and the private sector: skilled employees in the private sector may be paid as much as three times what an employee in the civil service might get paid. Hence, the retention of skilled employees remained a challenge.

5.4.4.3 Organisational Structures and Processes

Organisational practices surrounding staff appointments and selection for training did not appear to support skills development and retention within the organisation. There was no consistent practice of performance measurement, and even if performance was measured, there was little consequence for non-performance, and officers could not be sacked. Appointments to leadership positions were based on seniority – that is, length of time in the government service, rather than ability to perform the necessary tasks. While candidates for promotion were required to take examinations, it is unclear if these were current and relevant to their jobs.

Criteria for selecting staff for training were often vague and unclear. Some of the time it was based on seniority, and on other occasions, no published criteria were set out. One informant (SL9) suggested that IDBs funding the skills development programmes should select the candidates for training “[be]cause the government sometimes there are may be favouritism. They too biased, sometimes.”

5.4.5 Summary of Case

In the case of SL, one of the primary inhibitors to the implementation of e-Government systems appears to be the complex budgeting and procurement arrangements brought about by the desire to secure funding from IDBs. Conflicts between stakeholder needs lengthened and sometimes stalled technology procurement. The other primary inhibitor appeared to be strong

institutions like politically-linked unions which were reluctant to change current processes and practices.

Gaps in skills and competencies appeared to exist, such as in developing a coherent implementation strategy. National outcomes or development goals were not identified, and consequently, the sectors or agencies necessary to achieve these goals were also not determined. No action plans for these agencies could then be developed. This might affect the eventual outcome of the TRCA IS implementation, since dependencies on other parts of government were not considered.

Other skills and competencies in leadership and change management, process design and management, technology management, procurement, and technical skills also appeared to be lacking, but it was too early in the enactment process to determine if and how it will impact the eventual outcome.

Institutional arrangements surrounding compensation, staff appointments, and training opportunities did not appear to support the development and retention of skills and competencies. In particular, a large wage gap appears to have existed between the public and private sector, and appointments to various positions were not based on performance, but on length of service.

5.5 Case of MR

5.5.1 Background and e-Government Efforts

In Country MR, the implementation of a new National Identity Card system (NIDS) was studied. Along with the new ICT system, paper identity cards were also replaced with chip-enabled cards.

The World Bank classifies country MR as an upper-middle income country, with a per capita GDP of more than US\$9,000. Its economy is in transition between Stage 2 (efficiency-driven) and Stage 3 (innovation-driven) under the World Economic Forum's global competitiveness models. Sugarcane and sugar milling remains an important if declining part of the economy. Textile production, fishing and fish processing have been increasing in importance, and clothing, sugar and fish form the major part of the country's exports. In terms of literacy, MR is in the lower half of countries surveyed by the UN(Qian 2012). It is ranked in the top 30% of countries on the Corruptions Perceptions Index by Transparency International. (www.transparency.org)

Country MR is a multi-party parliamentary democracy. It is administered through approximately 25 Ministries and a number of smaller departments. It has one significant regional assembly, but almost all administration is through the national government.

At the time of the investigation, Country MR had at least three national plans or strategies for information technology spanning more than eight years. Early efforts focused on enabling legislation on electronic transactions, data protection, copyright and cybercrime. Efforts were made to improve telecoms infrastructure, to build manpower, and to create industrial zone dedicated to ICT. Within the government, various initiatives were launched to computerise government processes, most notably in Customs, and in the Citizen Information Division (CID). The government appeared to be committed to increasing the use of ICT going forward, and had published plans for increasing ICT adoption in the coming years.

5.5.2 State of Implementation

Before the latest system implementation of the National ID Card system, citizens of MR had a paper based ID card. The cards were administered by a unit within a Citizen Information Division (CID) which also registered births, deaths, and marriages. Amongst other things, it also produced statistics on these as well as marriages by tourists who often came to MR to get married.

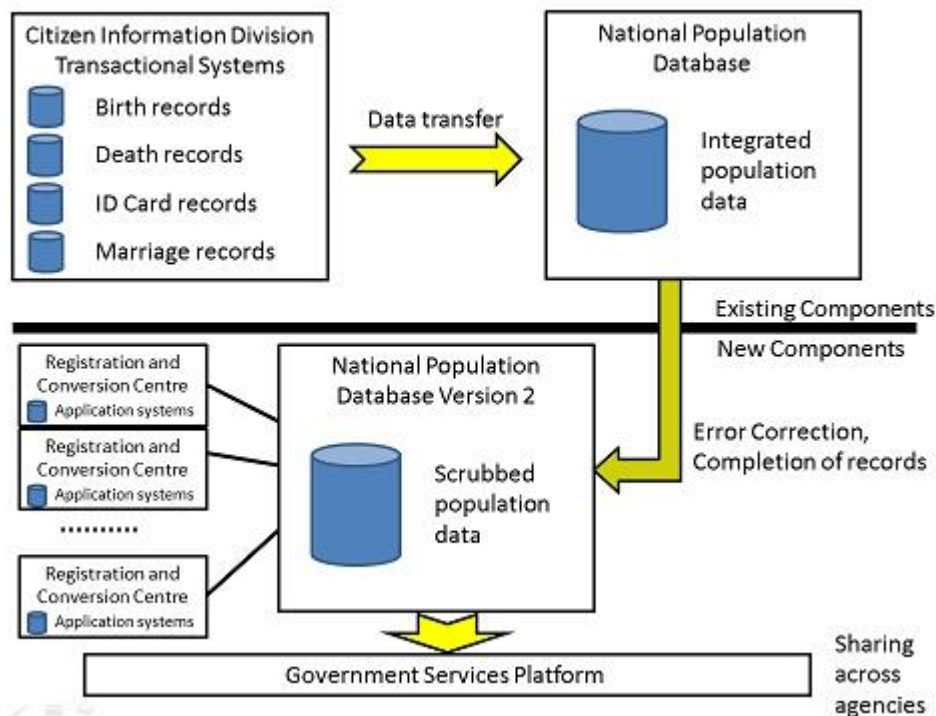


Figure 13 System Schematic (Case of MR)

There were existing computer systems that kept this information; however, these records were incomplete as a large proportion of the records remained on paper and were never digitised. A national population database integrated information from these disparate systems.

The proposed new system would produce a new, up to date national population database, as well as software that would support the issuance of the new identity (ID) cards and the replacement of old cards with new ones (See [Figure 13](#)).

The process to implement a new ID card was fraught with political challenges. The first ID card was issued in 1986. In 1995 there was a tender to replace the paper based card with one with a magnetic stripe, but the tender was not awarded. In 2000 there was another tender but there was political opposition to the project. One informant reports that while the bids for the tender were being evaluated by the government, the proposals were openly debated in Parliament. The project was abandoned. Another aborted attempt was made in 2005. In 2008, the government again put it in the budget. Assistance was sought from a foreign government between 2009 and 2010, and in 2012, with the assistance of a foreign government, a contract for the new system was finally awarded.

The project would be delivered through a legal entity set up by the foreign government to represent it (FGR), and two ICT vendors – a primary vendor (PV) appointed by the FGR to deliver the overall project, and a secondary vendor (SV) responsible for technical matters

relating to the ID card (See **Figure 14**). The CID and the National IT Department (NITD) would represent the government of Country MR. In reality, day-to-day project management from the government of Country MR was done by a representative of the NITD, which was the central ICT authority for the government.

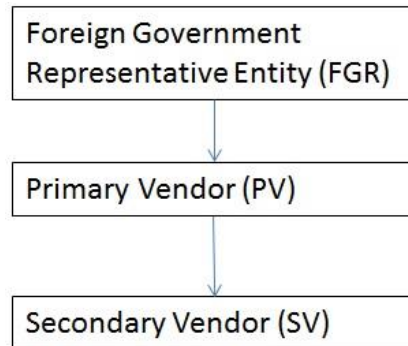


Figure 14 Initial Vendor Organisation (Case of MR)

From the outset (See **Figure 15**), there were serious challenges with project scope, organisation, and roles and responsibilities. While portions of the software development were clearly divided between the two vendors, the responsibilities for designing and developing the interface between components from both vendors were not. Data in the existing National Population Database (NPD) was inconsistent, inaccurate and did not provide the necessary foundation for the ID card conversion as was first assumed. The PV saw its role only in the design and implementation of the new database, and in supervising the transfer of the data from the old system into the new system. It did not see itself as responsible for correcting and improving the quality of existing data. However, the CID understood PV's responsibilities as providing a turnkey system, and hence fixing errors in the data, and creating an error free database essential for operations, was deemed to be part of their job scope. In addition, shortly after the project started, the timeline for implementation was shortened by a year, so that it could be completed ahead of the upcoming elections.

Issues around project management and direction also arose. The project director first assigned by PV to the task was in fact the salesperson who closed the contract. He operated from outside the country, and only visited Country MR on occasion. He struggled to understand the tasks that needed to be carried out, and to manage the disputes in scope and responsibility. Initially, he downplayed project delays due to the disputes by shortening the time allocated to downstream activities. His position became untenable, and he was replaced at the end of six months by a project manager who better understood the software development and implementation tasks at hand.

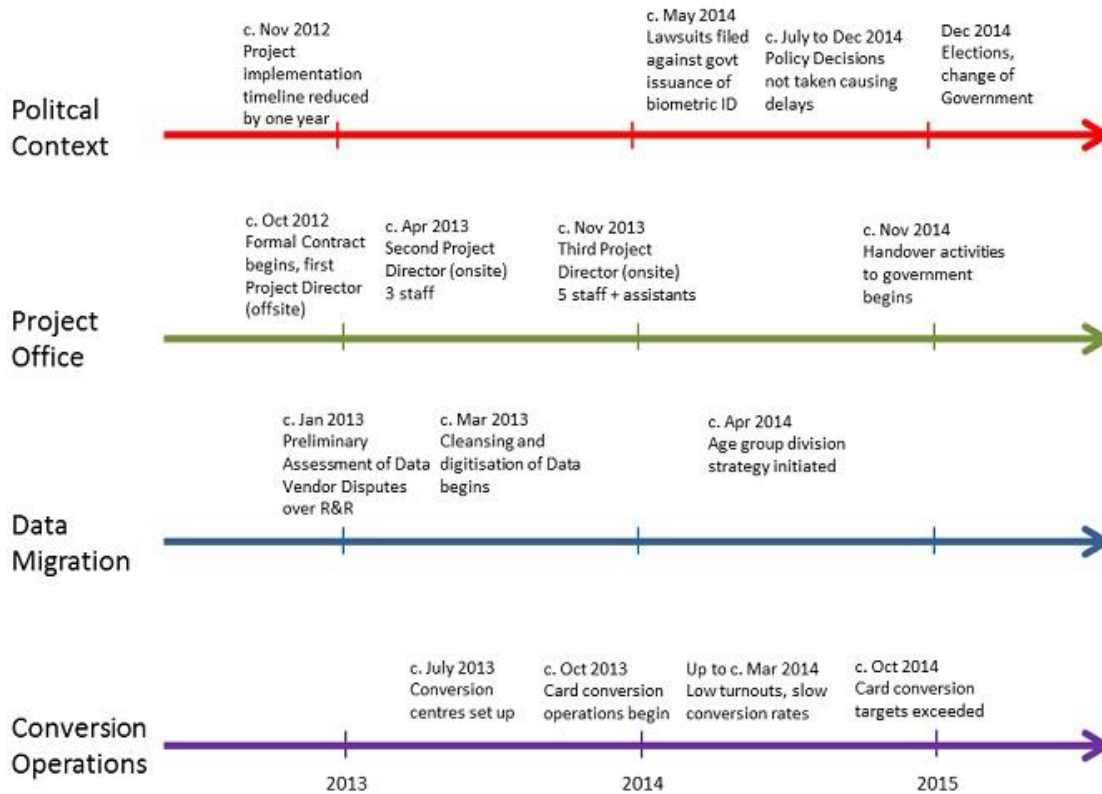


Figure 15 Enactment Process (Case of MR)

It became obvious after a preliminary data audit that one of the biggest challenges in the project would be to produce a usable body of data. The project required the swapping of the old paper ID cards for a new chip-based biometric ID card. Hence, the existing NPD was to have formed a starting point for the new database, and the basis upon which cards could be replaced. However, some digital records were kept in separate databases containing birth, death, marriage and citizenship information, and a lot of records remained on paper. Many records were inconsistent, incomplete or conflicting. There were also missing and duplicate records.

Problems included the following:

- 1) *Inconsistent data between the existing digital database and paper identification (ID) cards.* Women who marry often adopt the last name of their spouses, or adjoin the last name of their spouses to their birth (or maiden) name. When they choose to do this at the time they are married, the new names override the birth name in the electronic record. However, because this is treated as a separate process, a new paper ID is not issued, resulting in a discrepancy between the paper ID and the electronic record.
- 2) *Inconsistent data between the existing database and paper records.* Information in electronic records were sometimes inconsistent with paper records. Some of these

errors were attributed to the process of transcription between multiple copies, and in the process of data capture. While records of younger people were captured in the digital database, a large proportion of paper records for older people were never converted to digital form.

- 3) *No unique identifier for each person.* People were identified by their names; hence, it was difficult or impossible to distinguish between two people of the same name. This meant that some records of marriages could not be linked to a particular person, or that it was difficult to identify someone's parents through their birth certificate. Death records could not be properly associated with records in the National Population Database (NPDv1) that existed at the start of the project. Thus, it was not always possible to determine from the data if a person was still alive.
- 4) *Duplicate electronic records.* In some instances, it appeared that multiple ID cards were issued to the same person. The cause of this was not determined. There was speculation that it could be due to software errors or by parents using the same birth certificate to register IDs for siblings.
- 5) *Possible fake paper IDs cards.* There were cards in issue for which neither paper nor electronic records existed. It was possible that paper records were lost, or that the ID cards were not genuine.

While some of the errors could be corrected with the use of automated software tools, others required extensive manual intervention and investigations before they could be corrected. The dispute between consortium of vendors and the government of MR became very heated, and the foreign government was asked to intervene. The consortium and the government of MR eventually agreed that this work needed to be accomplished, and agreed on their respective roles in this process.

Recognising the severity of the problem, the government mobilised a retired senior CID manager to supervise the digitisation of paper records, and the investigation and repair of incorrect records. Because he was present in the organisation prior to its computerisation, he understood the key operating and data issues in CID. He attended a data governance workshop conducted by the vendors, and was therefore apprised of the necessary management policies, and operational processes that were needed. At the same time, a senior ICT professional was brought on board to lead the government end of the IT initiative.

Two processes were put in place to prepare the new National Population Database version 2 (NPDv2). The first involved digitising existing paper records (data capture), and the

second involved investigating and correcting errors and inconsistencies in the existing database, and in the paper records (data cleansing).

The paper records were collated by year, and kept according to the branch offices where the birth and marriage certificates were first issued. ID cards were sorted by names. This made retrieval of paper records for checking a complicated time-consuming process. A parallel exercise was initiated to scan images of the paper records, and tagging them with the branch, date and other information. Thereafter, these paper records could be retrieved electronically to facilitate the data entry of their contents into the digital database.

An iterative approach had to be taken in order to identify and resolve the various discrepancies within the data. Errors with similar originating causes were identified and categorised. Electronic searches were made to locate records with errors in one category, which were then corrected. Correction then proceeded to the next category. Many records had multiple problems and therefore had to be corrected multiple times. This process was particularly challenging because there was no documentation on how the databases were constructed, and no testing facilities. As a result, educated guesses had to be made on how different tables (collections of records) related to each other, and searches of the data could not be conducted efficiently. Initially vendor personnel from the SV lacked the expertise to perform this process quickly and progress was slow. Eventually, after much haggling, two additional personnel from the PV with the requisite skills were brought in to assist.

A computer program, produced to automate data correction, was not well received. This was because it could only correct formatting errors, but could not resolve the discrepancies involving relationships with records from different databases (birth records and marriage records, for instance). As such, it did not meet the expectations of the government.

In parallel with the computer program, investigation teams were formed in collaboration with the government to resolve discrepancies in the data. Sometimes this involved contacting two citizens with the same identification number or the same name so that correct records could be produced. Differences between the paper ID cards and the digital database were also corrected. This was much better received. However, progress was much slower and more labour intensive. Government officers also protested at the additional work, and overtime pay was allocated in order to secure the necessary resources.

While the process of data capture and cleansing was progressing, card replacement centres were set up, and the new software was tested and installed at these centres. Disputes between the two vendors escalated over how the centres were set up, and on their respective

roles and responsibilities during the conversion process. Although the data was not yet completely ready, conversion operations commenced with data that was available. However, progress was slow. The time taken to process and replace each ID card took a lot longer than expected. Huge queues developed outside the replacement centres. People would queue for hours and not get to service counters before the service counters closed for the day. One person died while waiting in the queue, causing a nationwide uproar. Card replacement rates were in the low thousands per week, and it was increasingly obvious that the target of converting 720,000 cards would not be met at that pace of operations.

“So the main challenge was always trying to convince people to come to the centres to get their records and also how to manage the queues, the huge queues...”

[MR06, Operations Manager in CID]

The second project director, while competent with the software and ICT implementation and deployment process, struggled to manage the conflict between the vendors. Since she came from PV, she was also expected to defend PV's interests over that of SV. Disputes between PV and SV became public before the government of MR. In addition, she came under increasing pressure by the government of MR to raise replacement rates, which also meant closely managing card conversions — an area in which she had no prior experience. Relations between her and the government representatives deteriorated drastically, with government officials increasingly dissatisfied with the progress. The government of MR eventually brought their concerns to the attention of the foreign government, and to the FGR. The disputes between the vendors and between the vendor consortium and the government of MR had reached a peak.

Realising that drastic action was necessary, the FGR changed the terms of the contract, removing the role of project director from the PV, and assuming that role itself. Key personnel in the SV and PV were no longer on speaking terms, and the contract between the PV and SV was converted to one between the FGR and the SV directly. A new project director was brought on board, and the project office was expanded to ensure sufficient resources for the expanded role.

The third project director spent a lot of effort in personally examining conversion operations on the ground, making small process changes, as well as recommending large ones. For example, at first all original documents were scanned, but this held up operations. A decision was made to only scan documents when a discrepancy was found between the documents and the official records of the CID, in order to substantiate any necessary changes. Standard operating procedures were created for the investigation and repair of inaccurate records. Log

books were introduced to track efforts and results, so that each issue was followed-up. A process was put in place so any difficulties could be brought to the attention of the project management team and a solution developed.

“At the working level, the project manager held a 1.5-hour daily meeting with the team. We reviewed the results of the operations at each of the distribution centres, the number of cards issued, crowd size, technical difficulties, any and every issue, and set up corrective actions for the day.”

[MR05, Operations Manager at Card Replacement Centre]

“We can do things, but we have also things not to do. So we had to follow our SOPs, and introduction of SOPs have been very useful, because prior this project people was doing their own way, and this was putting garbage everywhere so by introducing SOPs our staff, even myself were doing things on our own.”

[MR06, Operations Manager at Card Replacement Centre]

“... it was simple things when one of the first things the director asked me to do in the beginning was to go around the centres to check the timings. And he would review that under experience operations wise ... but at that point I didn't really see where he was going with this. I told myself I not sure how it will help to, you know, to save 5 minutes here or few minutes there, but it changed everything.”

[MR02, Project Leader on third project director]

“So someone came with a photocopy of her certificate and the staff were sending these people away, because we need the, we need the original. So, I just approach the lady and I look at her document, it was genuine. It was genuine so I ask the operator, I know that you're not obliged to take these people, but when you are turning people away there is a chance that these people won't come again. They won't come again, they have been waiting for so long hours and losing time. So I asked her where do you stay ... she was explaining me you know I have misplaced the original one and but I have to go home, I have to go home but I don't have any money to pay for bus to come back here. Then I was thinking to myself that it is unfair so when I went to the committee and I present them this case scenario, and then we agreed ... if they don't have any original, they could be bringing their photocopies ... then we have to implement another counter where our CID officer ... had to confirm whether it was a true copy or not.

[MR05, Operations Manager at Card Replacement Centre]

In order to meet the target replacement numbers by the publicly announced deadline, the project director grouped the citizens by age group, starting with the youngest 18 to 25 years, then 26 to 40 years and so on. Each group was then given separate time windows to come to change their cards. This allowed replacements to continue for the first group, while the data was still being corrected for the following age groups.

Change communication sessions were also held for CID staff, and the need for the new system and the change was communicated to them, and their roles clarified. This helped in increasing motivation. Extraordinary effort was made in some circumstances, including the building of extra service counters in a replacement centre within about three hours after the close of operations. One operations manager observed that this was “unusual” since in the ordinary course of business, something like this would take “two to three weeks”. Extensive effort was also made to communicate the change to the public, over television, radio, newspapers and face-to-face meetings.

In the meantime, work was slowed and interrupted by court proceedings. Members of the opposition had filed a suit against the government’s collection of biometric data. The expressed concern was the invasion of privacy. However, hundreds of cases of people holding multiple ID cards were discovered, and in some instances, people who had given up their citizenship retained their cards. It is unclear if citizens benefited from multiple ID cards, which would no longer be possible with biometric identification. Government officials as well as vendor personnel were called to court to testify.

Despite this, however, replacement rates picked up dramatically, reaching the tens of thousands each week necessary to reach the established targets. By the time September arrived, established targets of 750,000 replacement cards were met, and eventually, more than 900,000 cards were replaced by the close of the contract.

However, disputes still simmered over the maintenance of the software along with protracted negotiations on how continuing operations would be supported. Government officers were unclear of their roles after vendors left, and many were uncertain of assuming responsibility for the newly installed equipment. Shortly after the project was closed, elections were held. Opposition parties were elected to form the new government. The plaintiffs in the suits against government collection of biometric data were now part of the new government. This created great uncertainty amongst government officials on the future of the project.

At the time of the investigation, key stakeholders indicated that the project was a partial success. Using Heeks’ definitions, the project would be assessed as a “partial failure” (Heeks 2002). The following positive outcomes were observed:

- 1) *Vast majority of ID cards converted on time.* The target of 750,000 ID cards converted by September 2014 was achieved. At the end of the exercise, more than 900,000 ID cards were converted, representing almost all the adult population in Country MR.

"I would rate the project as successful in terms of time. We finished the project ahead of time. We had a rare result."

[MR07, Senior Government Leader in CAICT]

- 2) *Improved data quality.* Data quality and accuracy was significantly improved, resulting in a reliable electronic national population database.

"But the quality of data is excellent now, we have this correct data. It's like gold, you know, so valuable."

[MR07, Senior Government Leader in CAICT]

"But the biggest benefit is that it is much easier to do investigation to confirm that a person has been identified correctly. In the past, we had to use index cards to retrieve the records, and it took a long time."

[MR04, Operations Manager in CID]

- 3) *Increased service levels.* Service levels for the issuance of cards improved significantly during the project.

"Yes and still also increasing, increasing, speeding up, we are also speeding up the process of giving service to the people so nowadays people are telling us 'you don't even have a chance to sit on a chair'"

[MR04, Operations Manager in CID]

However, there were also a number of negative outcomes:

- 4) *Vendor disputes continued.* The ongoing support model was not clearly stipulated in the original contract, and there was significant difficulty in determining the appropriate support and maintenance model by the vendors after the mass conversion exercise.
- 5) *Lack of sustainability.* There was no clear long-term operating model. The role of government officers in managing ICT assets, performing ongoing operational activities necessary to support the new model of work was also not clear. Government officers repeatedly postponed or did not show up at key meetings where assets were to be handed over. Not all CID officers operated the software for the replacement and issuance of ID cards during the conversion exercise, and many were reluctant to assume the ongoing responsibility.
- 6) *Cost overruns.* While the contract was awarded on a fixed cost basis, the lack of understanding of the scope of work and the quality of existing data, and the pressure to complete it in a shorter than planned time frame, led to an unexpected increase in costs.

These included extra manpower costs to repair the data which required substantial overtime payments.

“There were also a few cost overruns, which are also rare because most of our projects are implemented and paid for on a lump sum basis.”

[MR07, Senior Government Leader in CAICT]

- 7) *Biometric data to be destroyed.* Plans to remove fingerprint information, used to uniquely identify each citizen and link them to the ID card were developed within two months after project implementation. The very mechanism that detected fraud and created a high quality national population database, painstakingly obtained through hundreds of thousands of man-hours of labour, would be removed from the system and destroyed. When asked how the quality of the data could be preserved in the future, senior leaders noted that it was a political decision.

“Now we are taking out parts of it, the biometric identification. It’s a political decision. We are not yet ready for this in MR.”

[MR07 Senior Government Leader in CAICT]

5.5.3 Possible Contributing Factors to the State of Implementation

The major cause of the poorer outcomes in the project appeared to stem from the initial lack of understanding of the scope of work which contributed to vendor disputes and less than effective project organisation.

Environmental factors such as election dates cause project timelines to be shortened, and the lack of trust between the citizens and government institutions led to the dismantling of part of the enacted technology. Institutional arrangements did not appear to impede implementation, and well-accepted protocols between functional agencies and the CAICT seemed to be in place. Processes and organisational structures of functional units did not seem to impede implementation. Project organisation, however, did not initially include key stakeholders. Processes to develop skills and measure outcomes were put in place for the duration of the project, and contributed to the more positive outcomes for the project.

	State of Implementation	Theoretical Construct	Possible Contributing Factors	Coded informant responses	Informant
1.	ID Cards converted on time Increased data quality Improved service levels	F1 Environmental Factors F3 Organisational Structure and Processes	Funding Government Priorities Project Organisation Skills development and retention processes	<p>Lack of funding was not an issue in this project.</p> <p>It was a priority for the government at the time because the old paper card had expired, and there were issues around the security of the card</p> <p>So it was also a way also to update our database so our database was up to date. We want a database that is up to date but we have real time information whenever any agencies or department or any governmental institution want any kind of information, we can give them accurate and real time information.</p> <p>[On project organisation] But it went to well-structured um where you'd have the director and five other people looking at five different areas um and through the months we even got assistants ... a senior ICT professional, was brought on board to lead the government end of the IT initiative.</p> <p>But one of the key ones was that the project was driven by the Prime Minister's Office (PMO). When the project was driven by the Ministry of IT, it did not take off. The project was run by the PMO and the Civil Status Division within the PMO.</p> <p>An advisor to the managing consortium suggested that a four-day data governance workshop be held to educate CID, and to guide the vendor consortium on the roles of data ownership, data stewardship and data accessibility and privacy. I held the workshop.</p> <p>During the project we have training from the [foreign government] team, then the local team trained the functional staff in operations. There were two types of training, one was the system training, the other was the training in the standard operating procedures (SOP). The IT people conducted the system training. The SOP training is ongoing, and I conducted the SOP training.</p> <p>The Singapore team had to do a crash course to train the different sections on my team: document management, card production, issuance and transmission of information. Before the project we had no qualified person for all these skills</p> <p>We are also encouraging people in our staff, what happened is that when we have shortage of staff so we have to fill up the empty spaces so we had to redeploy the staff but uhh even though they were not involved in the project</p>	MR07 MR05 MR06 MR02 MR07 MR03 MR04 MR05 MR06

		F4 Skills and Competencies	Measurements and KPIs	<p>directly, because they were working in the background, but uhh at any time, we might need their help. So from time to time the head of CID send these people on an emergency two to three days training how to use, how to manipulate, how to do the photo</p>	MR07
			Management and Leadership	<p>We had many KPIs for the project. Waiting time, process time, time to get it done. The vendors were paid on that basis.</p> <p>It was the way he approached the whole thing was different he, it was a lot of going on the ground and observing, obviously by then the centres are already running... he did a proper needs assessment, he went and looked and saw, he like opened up to the culture, so how people are, understood the, a need for motivation for people working on the ground these people working it the centres whereas before it's like but they're paid, we've hired them, we pay them to work. And they should work?</p>	MR02
				<p>The government mobilised a retired senior CID manager to supervise the digitisation of paper records, and the investigation and repair of incorrect records. Because he was present in the organisation prior to its computerization, he understood the key operating and data issues in CID. He attended the data governance workshop, and was therefore apprised of the necessary management policies, and operational processes that were needed.</p>	MR03
				<p>If these people weren't able to handle these problems then we will refer these problems to the command centre and also the command centre we had a log. The log right, so when we receive a call, what action was done, is the status active, terminated, is it closed, or open. And log we didn't have it before, how to monitor, how to check.</p>	MR05
			Change Management	<p>[On change management workshops]</p> <p>I think the people benefitted because they felt included. They felt, they understood more. You know people on the project we feel like every day is about the project you know from the, our side, from the government side as well.</p>	MR02
				<p>We divided the population into age groups, starting with the youngest 18-25 years, moving to 26-40 years and so on. Each group was given a different time window to change their cards so that crowds could be managed. We then launched an extensive communication campaign over television, radio, newspapers and held face-to-face meetings in universities and industrial centres to create awareness of the process.</p>	MR05
			Process design and re-engineering	<p>You have to be skilful on the operations, because by then it's about operations in terms of people registering, it's about a lot of other things but this takes a big part.</p> <p>So the process was ...you bring a set of documents, all of the documents are checked then they are scanned and then you move on to the step, the next step being you know, you give your prints, take your photo and then it gets verified and then you sign, you know give your signature and it's done. So they change the way, the step-by-step. Into, the scanning completely went out, they question the reason for scanning, and to some extent was tough</p>	MR02

			<p>General ICT Management</p> <p>Project Management</p>	<p>because government wanted to keep the scanning, it was like a security in some ways, but basically we broke the process into two, one called straight through, so er if you come in there's no discrepancy in your records so, cause they check my physical records against what's on the system, everything matches, there's no need for me, to scan my documents.</p> <p>... where the document is, is uhh when people come and fill up the form, usually what happen we just give people the form and people will do the application on his own. We have never help these people before the project. And now we are also assisting the people, we are writing them the letter where all the communication between our department and the respective courts...</p> <p>At the same time, a senior ICT professional, was brought on board to lead the government end of the IT initiative.</p> <p>[Of the third project director] But also someone who can really navigate amongst stakeholders, keep all of them happy, reassure them, um give them enough time ... in my eyes this new program office delivered.</p> <p>We also had a committed PM. We used very good analysis to decide where to place the registration centres for maximum effect. We had a good CA. [Vendor Project Director] understood the process in detail and tweaked it to make it work.</p>	<p>MR06</p> <p>MR03</p> <p>MR02</p> <p>MR07</p>
2.	<p>Vendor disputes</p> <p>Lack of sustainability</p> <p>Cost overruns</p>	<p>F1 Environmental Factors</p> <p>F3 Organisational Structure and Processes</p>	<p>Physical Infrastructure</p> <p>Project Organisation</p>	<p>... but the major thing was that we had connectivity issues across the sites.</p> <p>It's very likely that the roles were not well defined and I think maybe what I was trying to say before is it was not well structured, or not well organised. Probably that is a component of that because if you'd structure things well you'd say okay I need a director who will do this, this, this, who will give this amount of time to this project, who will be on the ground for this and who will look at that and I need a, maybe a manager who be you know and I need a ... So yeah I think that wasn't there at all you know.</p> <p>from the first there was a three person program office with the director flying in just monthly once, you know just for main committees</p> <p>Throughout this process, there were many organisational challenges. While the CID had the responsibility for national IDs, CID officers did not see this as their project. Instead, the project was driven by the CAICT. As a result, CID officers did not appear motivated.</p> <p>In addition, the national ID database required information found in birth records which was the basis of issuing national IDs; and in marriage records, in order to resolve the birth and married names. However, the units in charge</p>	<p>MR01</p> <p>MR02</p> <p>MR03</p> <p>MR02</p>

		F4 Skills and Competencies	<p>Management and Leadership</p> <p>of births registrations and marriage registrations did not see the project as part of their responsibility, but rather the responsibility of the ID unit within the CID. This was so, even though the units were part of CID.</p> <p>... so the other role of the program office is to manage and the companies you know, represents the [foreign government] and that's another challenge in the sense that you have other [foreign] companies running different parts and not necessarily agreeing on things. So that, a lot of people management issues.</p> <p>Yes with the type of project like this where you have outsourced models, one of the problems that happens is always so during the period where we are running the show, giving cards to people, registering them, it's the [foreign government staff] who are responsible for it so they've hired locals to work at the centers but it's not the government people. So the government people will now, from now on it's up to them to run the show.</p> <p>I think that actually because the time for that, given the contracts were established a year before, there was sufficient time to do so. But from what I observed the government here doesn't have the knowhow, the, you know, the way of thinking you know, of how to technically manage this project you know, how to know that this is the output you want and this is how you achieve it. So that knowhow was missing from the government, from the client side, the government side.</p>	MR02
			<p>Process design and re-engineering</p> <p>They did not engage in analysis on how their job could be performed better; or plan or design processes by which they could accomplish assigned goals such as resolving data discrepancies. It was also challenging to mobilise sufficient resources to complete the tasks.</p> <p>So all our, all our operational processes, all our documentation all our, you know, um how we handled things, entirely private sector.</p>	MR02
			<p>Change Management</p> <p>On the processing side, the senior officers understood the business processes intimately, and were frequently able to identify sources of errors, and why records might be inconsistent. However, these skills were not propagated to middle management and junior officers. This often resulted in inconsistent execution of processes at the ground level.</p> <p>So these for the people who work there was just like it's a new technology, great card, you know, nice, everything will be more efficient, and it's just thrown to them, there's no, there was no one to take care of them, as in walk them through the change. A lot of these people were reading in the newspaper about the ID card, they were not informed internally, and it was very difficult to get the managing government people to understand how this was important.</p>	MR01
				MR03
				MR01
				MR 03
				MR02
				MR03

			Information architecture and Data Management	<p>All this work required extra effort and time by government officers, and labour unions demanded more pay and overtime rates for officers working longer hours. Productivity in data capture and error correction amongst officers varied widely, but it was uncertain if this was taken into account in labour discussions</p> <p>Now um so the data is not clean, it's not clean because it comes from a whole bunch of different sources each of them interpreting the data in their own way, but mostly because the structure was not implemented to set up the flows that way.</p> <p>In the project as a whole, there was a significant lack of skills within the IT and CID staff around data administration and management. Data was amended without an audit trail, for instance, so it would have been impossible to determine if the database was illegally modified. Enforcement of control processes was weak.</p>	MR01
			General ICT Management	<p>Many records had multiple problems and therefore had to be corrected multiple times. This process was particularly challenging because there was no documentation on how the databases were constructed, and no testing facilities. Because of this educated guesses had to be made on how different tables (collections of records) related to each other, and searches through the data could not be conducted efficiently.</p>	MR03
			Procurement Skills	<p>... it was built on you know, essentially it's a 1 to 1 mapping between what physically the departments were, how they were organised, how their data flowed. And how you put into the computer, which is you know, you have 10 different departments, one for pension, one for births, you know, central... You know births, deaths, marriages, all these are different government agencies.</p> <p>So registration application is developed by SV but it belongs to government. It's written in a programming separate language from the conversion application. The conversion application belongs to SV. But there's a significant overlap between the two, but it's not the exact same application so a person trained on one will be able to use the other one.. slight retraining, nothing too major. If you have a bug on one it's not necessarily the same bug on the other side even though fundamentally it's the same thing</p> <p>Even the contractual terms were not properly defined. So what would be the bounds you know, how the responsibilities are there, what sort of um the deliverables</p>	MR01
				<p>... right from the beginning it was wrongly structured is when you have um different vendors coming in like that and it's, it's, it feels a bit like they're all... I mean I don't know I think they've never worked together before I'm not sure, that's important, the trust among vendors as well, you can't have the two of them taking each other out in a meeting room in front of the client</p>	MR02
				<p>There were many challenges within the vendor consortium as well. In most cases, disputes centered around roles and responsibilities of respective companies within the consortium. For example, the process of data cleansing had been started by a team in SV. This was because the PV team did not, at the beginning, see this as part of the</p>	MR03

			Project Management	responsibility of the consortium. However, when it became obvious that it needed to be done, many heated discussions were held over who should do what. Similarly, expectations of the consortium in the process of exchanging old cards for new were not clear. SV had assumed that they would support registration of new cards, but that their role in exchanging new cards for old was limited. As a result, they had initially assigned ten employees to registration but only two for conversion. Disputes later arose around the scope of work and the additional resources required.	MR02
			Database Administration	The root cause comes from how you break it down, how you want to um, how you wanted to work the holistic view you know how this team is going to work with that team and how it all comes into a whole. I think the, from first director to second director, complaints against first director was he was not present that much on the ground and he was more of a, he was the sales guy, he was the business development guy anyway the second person was an excellent program manager, project manager. She was managing a part of the, one of the tracks, did really well you know, knows how to manage a timeline, excellent, but the step from manager to director, from micromanagement to the macro management... it was a step up for her And those interfaces without validations in the database structure in which the birth table you know a birth table for someone cannot use variable data as a primary key right. It should have you know maybe an NIN but NIN's not reliable, it was written on paper so I can understand, you make your own number, a personal ID. The technical staff of SV (not locals) was unable to write the scripts (small computer programs) necessary to extract categories of flawed records. I had to devote a lot of effort in training them on how to do this, and checking the quality of their work.	MR01 MR03
3.	Destruction of portion of data collected.	F1 Environmental Factors	Social and cultural factors	... there has been court cases against the project you know saying three different, two different cases saying that it should be wiped out, all data collected specifically the fingerprint. So the fingerprint created an atmosphere of fear about lots of stories how you know you scares people to give their fingerprints because of misuse. Okay this is going to be a bit funny but the stories which went around and created major fears were that I go to a shop and I have a can of coke and afterwards I throw it on the ground and I leave. And then later on a murder takes place there and then they'll collect the can with my print on it and match my print from the police which doesn't have access, we've been saying that all along but anyway they'll match it and I'll be accused and, and you know convicted. MR has a problem following rules. So the politicians, it's a small country so you know if you have one group who's just saying that um we'll be very strict about it so just vote for the other guy and be. So it's very lax that way. Now we are taking out parts of it, the biometric identification. It's a political decision. We are not yet ready for this in MR.	MR02 MR01 MR07

Table 19 Possible contributing factors of e-Government Outcomes (MR)

Wide-ranging skills gaps were evident throughout the project: from general management and leadership, process design and change management, to ICT management, project management, procurement, and even technical skills. However, these were mitigated through the dynamic allocation of skilled resources at various points in the project. Hence, key project objectives surrounding card conversion targets, and the construction of an error free national population database, were still achieved.

A summary of factors affecting the state of implementation can be found in **Table 19**.

5.5.3.1 Environmental Factors

Environmental factors played a significant role in cost overruns and the eventual removal of biometric data. The project was a government priority, since the old paper ID cards had already expired. Funding was adequate, and even funds not in original plans were made available. However, the government wanted to complete the project in slightly over a year – before the next elections were to be held. This put pressure on the project managers, vendors and government officials working on the project. Government officers worked after hours to complete the necessary work within the desired deadlines.

The physical infrastructure was inadequate for the project, resulting in poor connectivity between the different locations where operations were conducted. Vendor personnel and government officers often stayed late to ensure that the data from the various centres were properly transmitted between the card replacement centres and headquarters. The additional work after office hours contributed to cost overruns.

Social and cultural factors such as the citizens' lack of trust of government institutions led to the planned removal of fingerprint information from government databases. Opposition was also evident in the lawsuits filed against the government throughout the process of implementation.

"... the stories which went around and created major fears were that I go to a shop and I have a can of coke and afterwards I throw it on the ground and I leave. And then later on a murder takes place there and then they'll collect the can with my print on it and match my print from the police which doesn't have access, we've been saying that all along but anyway they'll match it and I'll be accused and, and you know convicted."

[MR02, Project Leader in third project office]

5.5.3.2 Institutional Arrangements

Institutional arrangements were not found to have played a significant role in the less than positive outcomes. The role and interaction of the CAICT and the functional CID agency

seemed to be well established. Although informers felt that the CAICT played the major role in the implementation of the project, leaders at the CAICT acknowledged that the project succeeded in part because it was led by the CID. Little conflict was evident, and may have contributed to the positive outcomes.

5.5.3.3 Organisational Structure and Processes

The organisational structure within the CID did not appear to have a major impact on the outcomes, although poor processes, around ID card issuance, birth, marriage and death registrations may have contributed significantly to the poor state of the data within CID at the beginning of the project.

The project organisation structure evolved through the enactment process. Initial structures had difficulty with role clarity between the vendors, key stakeholders from units within the CID were excluded, and insufficient on-the-ground resources. A large portion of these challenges seemed to be due the lack of clarity and understanding by all stakeholders of the extent of and scope of work necessary to accomplish the objectives.

This was later improved through the appointment of a third project director by the FGR and a senior ICT professional by the government. The project director then instituted change management and skills development processes as part of the project. These included workshops for change management, data governance, and functional processes like document management, card production, issuance and transport. Standard operating procedures were put in place. Measurements and KPIs were instituted for the project, and performance targets set for the vendors.

5.5.3.4 Skills and Competencies

It would be difficult to attribute the less than satisfactory results of vendor disputes, lack of sustainability and cost overruns to the lack of any one skill. Multiple skills gaps, both in the vendor consortium, and in the government, contributed in various ways to these outcomes.

The lack of understanding of the scope of work, for instance, reflected the lack of ability to lead and manage functional units in the performance of transactional processes. While leaders of the CID and the CAICT understood that there was a data problem, they did not initially understand the size and nature of the problem, its causes, or what they needed to do in order to address the problem. One informant (MR03) observed that officials "... did not engage in analysis on how their job could be performed better; or plan or design processes by which they could accomplish assigned goals such as resolving data discrepancies".

Gaps in competencies in data governance and the design and enforcement of processes to ensure quality data formed part of the root cause of the initial poor data quality. Data definitions were not consistent and data was amended without due process or controls. This was exacerbated by the lack of general ICT management – poor systems documentation, and isolated department by department systems without consideration of larger organisational needs or strategy. Processes that were eventually adopted were designed and documented by foreign experts.

The government also exhibited a hands-off approach towards procurement and structuring of the commercial contract. Perhaps it was because the government expected the FGR to perform this role for them, or perhaps they lacked the skills to do so themselves. The FGR appeared to lack the procurement skills necessary to structure a well-defined contract: the roles of the various vendors were not well-defined, and they did not understand their role in mitigating conflicts of interest. This led to vendor and project team disputes shortly after the project began, and the subsequent major restructuring of commercial arrangements.

The lack of project management skills was most evident in the first project office managed by PV. This improved when a second project director was assigned, but as the project progressed, the demands on the project director included navigating a complex stakeholder environment, and experience in managing operations. Despite support from more experienced team members, the second project director was removed, and another project director with the requisite experience had to be brought in.

The lack of technical skills around database administration and design led to flawed designs for the original systems in CID, and lengthened the process of data cleansing. Key design principles were violated by the initial implementers, contributing to unnecessarily complex structures, and unreliable data. The lack of skills in the SV meant that navigating these complex structures, and writing programs to fix flawed data took longer. The addition of skilled personnel from the PV helped alleviate this problem.

The lack of a sustainable operating model after the completion of the conversion exercise can be partly attributed to the lack of change management skills. Officers in the CID were not prepared for their new roles, and initially found out details on the project only through public sources like newspapers. New roles and responsibilities were not clearly articulated, leading to reluctance to assume responsibility for the new system. These issues remained unresolved at the time of the investigation.

5.5.4 Factors Affecting Skills Development and Retention

In examining the factors affecting skills development and retention, the study is limited to skills development and retention within the government. While there were also gaps in skills within the FGR and the vendors which merit study, they have been excluded in order to provide comparable data to the other cases in this research project.

Environmental factors did not appear to play a part in skills development and retention. However, the government of MR lacked a capacity building framework, and did not view skills development as part of the ordinary course of business. The process of appointing personnel did not seem to consider skills and competencies required for the job.

5.5.4.1 Environmental Factors

There was little evidence that environmental factors affected the level of skills development and retention within the functional agencies or CAICT. MR ranked close to the middle in human capital under the UN e-Government Survey 2014. Funds for training were allocated, but in the case of CID were not used.

5.5.4.2 Institutional Arrangements

The government of MR did not appear to have a capacity or skills development framework. Prior to the project little or no training appeared to have been conducted for CID officers. One operations manager (MR05) in CID expressed surprise that training might even be needed in the absence of a project – “Without the project why train staff?” This is despite the fact that the training on document management, card production, issuance and transport to which he referred, would be relevant even in the absence of the new technology. These processes behind these functions would be different without the new technology, but the objectives would remain, and one could reasonably expect new staff and existing staff to be trained on how to perform these functional tasks.

Training budgets were often not utilised, and appeared dependent on individual managers. Training also seemed to be associated with overseas trips, and not with learning particular skills. It is uncertain why a number of government officers were sent overseas, rather than having an instructor brought over to MR, which might have been more cost efficient. One project manager (MR02) noted that when the subject of training on change management was brought up, a senior leader expressed scepticism. She highlighted her own experience in a programme run by an IDB, where participants were more interested in social activities and their per diem, and suggested that the scepticism was brought about in part by such experiences.

5.5.4.3 Organisational Structure and Processes

Processes for appointment of personnel did not appear to consider skills and competencies. One informant (MR01) noted that while there was a pool of highly educated citizens, they did not “get that much involved in the government side because getting into government typically involves you know contacts ...”

This occurred even in the context of the project. As part of the project, a large number of additional, temporary workers were hired in order to staff card replacement centres. Processes to recruit these workers appeared flawed. Project managers and operations managers were dissatisfied with the quality of personnel, and local recruitment agents were unable to fulfil agreed upon numbers.

Performance measurements appeared to be unevenly applied, and not institutionalised across the entire government. They did not apply to CID officers. Some metrics were used in the context of the project, but they were geared towards project goals. These measures were not carried through into the new operating environment and applied to CID officers after the close of the project.

At the time of the investigation, the roles of officers in CID and CAICT in operating and maintaining the new systems and in performing the new operations processes remained unclear. This was exacerbated by the new government which moved responsibility for the “ID card project” into the Ministry of ICT. This was despite the fact that there was to all intents and purposes no longer a project, but continuing operations within CID. The change in organisation structure and lack of role clarity are likely to adversely impact the retention of skills within the government.

A summary of the possible contributing factors to the development and retention of skills in Country MR and the associated informant responses can be found in **Table 20**.

Theoretical Construct	Possible Factors	Coded informant responses	Informant
Institutional Arrangements	No Capacity Building Framework	<p>The [foreign government] team had to do a crash course to train the different sections on my team: document management, card production, issuance and transmission of information. Before the project we had no qualified person for all these skills. Without the project why train the staff?</p> <p>So regarding the training, the training ... uhh ...the budget, before that person came was around 50,000 [local currency] on a yearly basis and even with 50,000 was not utilized so at the end of the year we had to send back the money.</p> <p>... the other thing is you have IDB sitting there in the room and delivering a training which is like a classroom training and they're talking about general you know it was financial instruments like, things like you know macroeconomics. Yes and it's not contextualized enough and it's Africa their reality are different and their challenges are different and that's not addressed and yeah. So I think this guy I talked to probably had gone to these similar things.</p>	MR05 MR06 MR02
Organisational Structures and Processes	Appointment of personnel Measurements and KPIs	<p>... the whole thing is that the MR context is frequently driven by favoritism and you know contacts and things like that because it's a small country ... The pool of competency here is extremely high, education levels here are crazy, you know you have people competing with [foreign country] you know in the SC, HSC exams, Higher School Certificates, School Certificate exams. So we've got people topping this globally but they come here they don't get jobs. And they don't get that much involved in the government side because getting into government typically involves you know contacts, most other things.</p> <p>... the staffing very badly handled ... So you have um you know where you're sourcing the staff from, what sort of vetting process.</p> <p>... so you have one set of CID Officers who are handling the system for particular, for the mandate of one government. The data is disastrously bad, they don't care, they are all getting paid sitting on you know. And if there's an issue, the next administration will take care of it,</p> <p>[On measurements and KPIs] It's pretty new in MR. In the civil service it's been looked at maybe 3-4 years, maybe more, 5 years ago but it's been, it's a bit sectorial at the moment, Yes, that particular organisation doesn't have it yet, the CID</p> <p>Review of KPIs once a year. Based on key tasks, such as procurement etc. For the project we wanted to reduce the documents produced in order get the ID card, but we still need the birth certificate.</p> <p>We had many KPIs for the project. Waiting time, process time, time to get it done. The vendors were paid on that basis.</p>	MR01 MR01 MR01 MR02 MR04 MR07

Table 20 Possible factors influencing e-Government skills development and retention (MR)

5.5.5 Summary of Case

County MR provided a case where the dynamic allocation of skilled resources during the course of the project allowed some of the projects major objectives to be achieved.

Environmental factors such as election dates and political opposition put pressure on project managers and staff. Poor project organisation resulted from the lack of understanding by key stakeholders on the scope of the project. Wide-ranging skills gaps were evident throughout the course of the project.

However, repeated interventions allowed the gradual insertion of skilled personnel. Additional resources were also applied to address the unexpectedly large scope of work. This allowed the creation of a clean body of national identity data, and the majority of ID cards to be replaced – two key objectives of the project.

Still, longer term issues continued to fester after the close of the project. At the time of the investigation, the long-term support model for the technology was not yet fully developed, as was the long-term operating model for the government. A key component of the technology - biometric data - was in the process of being dismantled.

The lack of a capacity-building framework, unevenly applied performance measures, and appointments of personnel based on contacts hampered skills development and retention within the government.

Chapter 6 Cross-Case Analysis

In the previous chapter, each case was examined individually using the a priori model described in Section 3.3.1 ([Figure 7](#)). In this chapter, commonalities and differences in each of the cases will be examined.

Common outcomes such as poor connectivity can still be attributed to environmental factors such as poor infrastructure, especially amongst government agencies. Other common outcomes such as delayed implementation, and poor procurement outcomes were caused by a combination of institutional arrangements, organisation structures and processes and skills and competencies.

In cases where there were multiple coordinating bodies for e-Government and multiple channels for procurement, systems with duplicate functionality or systems of unclear value were sometimes procured. Delays in implementation were caused by complex investment and procurement processes, and a lack of skills in justifying and specifying requirements for such investments. Unclear or rapidly changing roles in some agencies, together with skills gaps in process design complicated the establishment of ICT-enabled processes. In addition, the lack of knowledge of what e-Government implementation entails, and of the ability to set direction and clear objectives, led to poor project organisations, vendor disputes, and delays in implementation.

Across the cases, institutional arrangements and organisational structures and processes did not appear to support the development and retention of skills. There were few formal frameworks to match skills to job roles. Training was not always efficient, or targeted at the relevant personnel. The lack of performance measurement, and the appointment and promotion of personnel based on considerations other than ability, did not provide incentives to officers to increase their skills and competencies.

6.1 Outcomes and Possible Causes

The outcomes documented in the cases represent the state of implementation at the time of the investigation. Enactment is an ongoing process, and these outcomes may well change over time. However, whether the outcomes meet the goals of the stakeholders within a specified time frame remains a useful measure of e-Government implementation success. [Table 21](#) contains a summary of the major outcomes from the five cases.

BR	BW	DN	SL	MR
<ul style="list-style-type: none"> - Poor connectivity and availability - Non-functional or functionally incomplete systems - Low adoption - Delay in, or non-implementation - Unclear value in IT procurement 	<ul style="list-style-type: none"> - Poor connectivity and availability - Delay in, or non-implementation - Unclear value in IT procurement 	<p><u>NSO</u></p> <ul style="list-style-type: none"> - Reduced data collection effort, increased accuracy, reduced turnaround time <p><u>CAICT</u></p> <ul style="list-style-type: none"> - Delay in, or non-implementation -Unclear value in ICT procurement 	<ul style="list-style-type: none"> - Delay in, or lack of implementation - Unclear value in IT procurement 	<ul style="list-style-type: none"> - Almost all national ID cards replaced - Improved data quality - Increased service levels <p><u>BUT</u></p> <ul style="list-style-type: none"> - Vendor disputes - Cost overruns - Partial destruction of data

Table 21 Cross-case Outcomes

6.2 Environmental Factors

In some cases, environmental factors such as the lack of physical infrastructure still created issues around connectivity, and thus availability of functional systems or office automation software such as email. It is useful to note that BW ranked close to the middle of the telecoms infrastructure index in the UN e-Government survey, BR ranked in the upper half, and MR in the top one-third. Yet in these three cases, connectivity within the government remained poor, and in the case of BR and BW, there appeared to be a gap between what was available to private enterprises such as restaurants and hotels, and what was available to the government.

Other environmental factors such as adequacy of funding did not appear to be an inhibitor, although other than the resource based economies of BR and BW, other countries seemed dependent on IDBs or foreign aid. In four out of five cases, high level e-Government plans or strategies were set out, but they vary in specifics about how particular economic or national targets can be achieved through e-Government. Literacy in the general population did not play a major part in the cases as the systems under investigation were mostly focused on internal government efficiency. There was limited evidence that some social factors such as distrust of government institutions can significantly affect the outcomes – adoption of e-payments in BR, and the collection of biometric data in MR.

A summary of the impact of environmental factors can be found in **Table 22**.

	BR	BW	DN	SL	MR
eGov goals and priorities	eGov Plan since 2001 No targeted strategy	eGov Plan before 2006 No targeted strategy	Economic development plan No targeted strategy	eGov Plan since 2002. No targeted strategy.	eGov Plan before 2006 National ID replacement a priority
Funding	Adequate	Adequate	Adequate, some through IDBs	Mostly from IDBs, sometimes handicapped by lack of knowledge	Adequate, some through direct foreign aid
General Literacy (UN e-Government Survey HCI Ranking)	Second quartile	Third quartile	Third quartile	Second quartile	Third quartile
Physical Infrastructure	Adequate in private sector, poor in govt	Costly, and cited as inhibitor	Good	Not cited as inhibitor.	Not adequate, cited as inhibitor
Technological Maturity	No finding	No finding	No finding	Lack of available databases likely to inhibit implementation	No finding
Social and Cultural Factors	Reluctance to use epayments because of lack of receipt	Unwillingness to try something non-traditional	No finding	No finding	Lack of trust in government institutions

Table 22 Cross-case Environmental Factors

6.3 Institutional Arrangements and Organisational Structures and Processes

As can be seen the most common outcomes are delayed implementations, and unclear value in ICT procurement. Institutional arrangements surrounding the CAICT, and procurement appear to be one major contributor to these outcomes, the other being the lack of skills around technology procurement. Project organisation also contributed to whether ICT was eventually adopted. In cases where ICT was enacted, DN and MR, projects were led by functional organisations, while differing interests between sponsors, project managers and team members delayed projects in BW.

In three out of five cases, there were multiple coordinating bodies for e-Government. This may have impeded efficient implementation. In the case of BR, it was not clear how the acquisitions of application systems and infrastructure were coordinated. In the case of BW, poor governance, possibly because of multiple coordinating bodies, resulted in multiple channels of procurement. As a result, multiple systems with the same functionality were unnecessarily procured.

Except in the case of SL, the CAICTs appeared not to have a strong role on e-Government implementation. They did not play a major role beyond setting low-level technical standards surrounding hardware, network protocols, and programming languages. They were consulted only on a case-by-case basis. As such, opportunities for sharing of technology components, common information sharing standards, and efficiency in procurement are likely to be missed. Functional agencies sometimes hired their own ICT personnel and ran independently of the CAICT. This would make sharing and optimal allocation of scarce skilled personnel more difficult.

Institutional arrangements around procurement delayed implementation in BR, DN and SL. In the case of BR and DN, functional agencies found internal requirements for ICT spending difficult to fulfil. In BR, institutional arrangements did not allow ICT budgets to be combined into a multi-year plan, which would be required for large system implementations. In DN, approvals for budgets come ahead of feasibility studies outlining costs and benefits. Then limits on spending created an incentive for large projects to be divided into many smaller ones. This, combined with the lack of skills in project managers to develop sound feasibility studies for large projects, made senior managers reluctant to approve expenditure. In SL, because funding came from external stakeholders, primarily IDBs, procurement arrangements were complicated because internal government procedures and procedures imposed by IDBs were not always in

congruence. Project managers often found satisfying multiple stakeholder needs to be a long and painful process.

“Sometimes, the technical evaluation report, IDB stops there. We have to go to a tender board, we have to go to a procurement committee. But IDB says give us the technical report and we will approve it, but if there are changes to that and if you have got the approval from the procurement committee earlier you will have had to go back and say look IDB asked us to change this. So we have clashes all the way...”

[SL3, Project Manager in functional agency, SL]

“The requirement in this decree asks for something technically difficult, especially for the cost norms. The cost norm is very, very low. In order to get enough money to do a system, the project owner has to play around with the number to meet cost norms. A lot of time is spent playing with the cost norms to get the money for the project. The other problem is the dependence on personal relationships in order to get project approval. For example, ...relationship is good with MPI, MOF, good relationship with the Minister, you can get approval. The proposal very short...If your relationship is good you will get this amount of money.”

[DN05, Project Manager CAICT, DN]

Other institutional behaviours, such as the reluctance to share information did not allow for cross-agency databases in DN, while strong, unionized resistance to technology adoption and change inhibited implementation in SL.

Roles within the functional organisations where ICT was implemented, in the cases of DN and MR, were generally clear. In other cases, such as BW, SL, and some parts of DN, roles were not always clear, or else shifted often. Officers charged with process design or re-engineering found it challenging to make meaningful changes in such environments. Requirements for systems that were dependent on new processes could not therefore be finalized.

At the time of the investigation, the functional organisations in BR and SL had not yet reached the point of creating formal project organisations for project implementation. In the case of BR, however, a senior leader had noted the challenges in mobilising the right resources to form the project team for ICT projects. In the case of BW, the multiple interests of stakeholders resulted in unclear project objectives. While ministries were grouped into themes for projects, project managers and process designers noted that the interests of sponsors, project managers and team members were often not aligned. On the other hand, project teams led by single functional agencies in DN and SL managed to implement ICT systems that met all or some of their objectives.

	BR	BW	DN	SL	MR
Central ICT Coordination	Two central coordinating bodies: Infrastructure and applications. Individual departments have ICT personnel, in process of consolidation.	Multiple coordinating bodies. Structure in transition. Some departments have ICT personnel.	One central coordinating body. Individual departments have ICT personnel.	Two central coordinating bodies: roles unclear. Some individual departments have their own ICT personnel.	One central coordinating body. Parastatal provides IT solutions.
ICT Investment and Procurement Practices	Investment and procurement process not adaptive	Multiple channels for procurement	Funds allocated prior to justification, institutional practices favour fragmentation	Multiple internal and external stakeholders with conflicting needs.	No finding
Governance and Standards	No major role	Poor governance and oversight	No major role	Consulted on adhoc case-by-case basis	Projects centrally coordinated by CAICT
Other Institutional Arrangements	No finding	No finding	Institutionalised reluctance to share information	Institutionalised resistance to change. Strong unions.	

Table 23 Cross Case Institutional Arrangements

	BR	BW	DN	SL	MR
Project Organisation	No finding	Ministries and agencies grouped into themes. Project objectives and roles unclear. Misalignment between sponsors, project managers and team.	Project organisation for NSO project had required stakeholders and skilled personnel	No finding	Initially not well structured and excluded key stakeholders, but improved during course of project.
Roles and Role Clarity	No finding	Roles between ministries not always clear. Multiple eGov coordinating bodies	Roles within NSO clearly identified. Less so across government agencies.	Roles often change, and responsibilities moved from ministry to ministry	

Table 24 Cross Case Organisational Structures and Processes

A summary of the impact of Institutional Arrangements and Organisational Structures and Processes can be found in [Table 23](#) and [Table 24](#) respectively.

6.4 Skills and Competencies

Skills gaps that impeded implementation or led to poor procurement outcomes included: management competencies such as the lack of ability to direct e-Government projects, lead change, and establish new processes; and technology management competencies in the areas of project management, procurement, and data governance. Technical skills and end-user ICT literacy skills in government appeared to play only a small part in inhibiting implementation. A summary of skills gaps across the five cases can be found in [Table 25](#).

Across the five cases, the leaders have cited the lack of understanding of how to use ICT, how to use ICT to support the achievement of functional goals, or how to go about implementing e-Government projects. Projects often lack specific goals tied to functional roles, and are sometimes focused only on website creation. In some instances, leaders were unable to mobilise appropriate personnel. In the cases of DN-NSO and MR, projects led by leaders of functional units had clear objectives, and managed to achieve some or all of their major goals.

“Well, the challenge now is that, because we are at the initial stage of development. First is lack of knowledge, we have the challenge of what it is that has to be done.”

[BW6, Senior Leader in functional agency, BW]

Many leaders cited the need for change management, with some expressing the need for such skills even before projects were clearly defined. Others, in the case of MR, were not aware of such a need. Understanding of change management amongst those who acknowledged the lack of skills in this area, however, varied. One senior leader in SL expected external experts to do change management on his behalf, and did not see his role in leading change. Others in BW were prepared to lead the change, but were uncertain about how to go about doing it.

Process design skills were also in short supply. In the cases of DN and MR where ICT was successfully brought into operations, processes were redesigned as part of the implementation. However, in other cases, leaders expressed the lack of business process re-engineering skills. In the case of BW where there was a dedicated team for BPR, team members suggested incremental improvements but failed to address underlying management issues. In DN, leaders noted that process re-engineering was also linked to government reform. Leaders in SL and BR understood the need for the change in processes in order to adopt ICT but did not know how to go about doing it.

“There is a strong need for business process re-engineering and reforming government. I am more worried about the processes. The private sector has made a lot of progress ... There is no competitive pressure in government to make the change”

[DN04, Senior Leader in ICT-related agency, DN]

On the technology management front, SL and MR faced challenges in documentation and software management – problems common even in developed countries. However, the skills gaps most commonly found were in project management, procurement and data governance.

There was a lack of skilled project managers within the government agencies in BR, BW, and DN. In SL, the project was not far along enough in its implementation to have a finding. In MR, it is not clear the extent to which government project managers planned for and coordinated implementation. By and large, this role was taken on by initially unskilled project managers from the vendor. The lack of skilled project managers meant that projects were not directed: task identification, sequencing, and allocation of appropriate resources were either not done by government project managers or else done poorly. Leaders note that project managers who were “certified” by external bodies were still not up to the task.

Challenges in procurement covered three areas. The first surrounded the justification of ICT investments. In BR, and DN, this gap was recognised. It was not clear whether such analysis was required in BW, SL and MR. The inability to put together sound feasibility studies and justifications made navigating the institutional procurement arrangements more difficult. This may have been compounded by the fact that in some of these countries, state employees could not be fired. Therefore, efficiency justifications based on savings in labour would either not be conceived, or would be dismissed.

“Because if I spend 5 million dollars and get a value of 10 million, yeah that will return. Rather than focusing on a project costs ...that costs a million. I don’t know what the value is... how we generate value... that ... can be quantified.”

[BR1, Leader at CAICT, BR]

	BR	BW	DN	SL	MR
Management and Leadership	Unable to mobilise appropriate resources	Leaders lack knowledge of eGov implementation.	NSO project led by functional leaders with clear objectives. In other instances, leaders cite lack of ability to identify information needs, and functional managers do not often take accountability for ICT projects	No clear priorities. Focus on website creation.	Competent managers and leaders inserted into project
Process Design and Re-engineering	Solutions do not take into account different requirements and implications not understood	Leader expressed lack of BPR skills. Process design team often did not address underlying problems.	Leaders express need for re-engineering and government reform. Current processes unclear. Within NSO processes redesigned.	Uncertain about how to proceed to redesign processes.	Processes were redesigned as part of project. New process standards issued.
Change Management	No finding	Leaders express lack of change management expertise	Changes made as part of NSO project clearly documented and communicated	Change management cited as inhibitor by leaders and project managers	Change management initiatives taken up as part of project
General ICT Management	No finding	No finding	No finding	Software not managed across different versions.	Poor documentation and maintenance of systems. No applications architecture.
Data Governance	No finding	Multiple systems unable to share information	Standards set as part of NSO project, but no data sharing platform across agencies	No finding	Poor database design. Poor governance processes
Procurement Skills	Unable to justify value of ICT investment. Difficulty in evaluating solutions and vendors	No finding	Extensive studies undertaken by external expert within NSO project. Procurement primarily restricted to hardware on other projects.	Difficulty in making technical assessments, developing specifications for vendors.	Post implementation on-going maintenance and operations not considered. Unclear vendor roles.
Project Management	Limited to logistics and updates	Leaders express gap in project management skills, note that certified managers do not know how to do the work.	Project managers did not identify interdependencies, and had little capacity.	No finding	Initial vendor project managers less skilled, replaced by more competent ones.
Technical Skills	Many graduates can't solve technical problems	No finding	No finding	Skilled personnel available in private sector but not in government	Skilled technical personnel injected into project. No finding on country MR's technical personnel.
End User Competencies	No finding	ICT literacy in government mixed	Functional ICT competencies retained by government staff	ICT literacy in government mixed	Not clear if functional ICT competencies retained by government staff.

Table 25 Cross Case Skills and Competencies

The second challenge surrounded the specification of the scope of work for the vendors, and the third was in evaluating vendors and their solutions. In BR, project managers and vendors noted that this sometimes led to inappropriate purchases. In SL, this was cited as a possible reason for delayed implementation. And in MR, the lack of understanding surrounding the scope of the project led to many vendor disputes after the contract was awarded. In DN, the gap was filled with external expertise for the NSO project, but other projects were mostly limited to purchases of hardware, for which technical specifications could be easily found.

There was some recognition by leaders that skills in data governance and in establishing data sharing standards were lacking in BW, and after the project began, in MR. The gap in MR was most obvious - the lack of skills in data governance led to poor data quality and poorly designed databases. In DN, a senior leader had established qualifications in information management, but institutional norms and the inability of functional managers to identify information needs seemed to inhibit data sharing. In BR and SL, projects had yet to reach a stage where technology management skills in this area were required.

The lack of technical skills in government did not seem to impede implementation, since projects were contracted out to the private sector. However, in the case of BR, when some work surrounding maintenance of systems was carried out by the government, the lack of technical skills did result in reduced availability of systems.

In the context of end-users, the level of ICT literacy was mixed, generally with older users more reluctant to adopt ICT than younger ones. In the cases of DN-NSO and MR, however, this did not seem to impede implementation significantly. A combination of classroom training, on-the-job training and change communication workshops allowed for skills to be transferred to the end-users and allowed them to gain functional ICT skills.

In summary, gaps in management and leadership competencies in setting directions and establishing project objectives, mobilising resources, leading change, and establishing new processes delayed e-Government implementation. Skills gaps in technology management and implementation, such as project management, procurement and data governance delayed implementation or led to unclear value in ICT procurement.

6.5 Factors Affecting Skills Development and Retention

Across the cases, environmental factors appeared to play little or no role in skills development and retention. Institutional arrangements around hiring, and organisation structures and processes around appointments, promotions, performance measurements and

training appeared to place little importance on skills and competencies within the government agencies (See **Table 26**).

In four of the five cases, no framework for matching skills and job roles appeared to be in use. In some cases, training was proposed by staff, and discussed with managers, and thus varied across ministries and agencies. In BR, where education was often paid for by the state, students were sometimes sent to study in fields where their skills and knowledge are not relevant to the jobs available. In DN, required training was focused on political ideology and government structure. In MR, training in functional roles was primarily in the context of the e-Government project, and was seldom conducted outside of the project context. This was also true in DN. In SL there were requirements for entry into particular services such as accounting or planning services, and examinations as part of seniority based promotions. However, it was unclear if skills and competencies surrounding management and leadership, and other skills identified as necessary for e-Government implementation, were considered in these requirements.

Training in SL, MR, and DN seemed to be equated to some degree with being sent out of the country. It is not obvious why skills could not be acquired in country, and why experts cannot be brought into the country, which would be more cost efficient than sending a large group of officers abroad. The selection of officers for such trips abroad was sometimes based less on needs but on seniority (BR), or other reasons (SL). Only in two instances (DN-NSO, MR), skills and competencies were demonstrably passed on to government officers, but only through the e-Government initiatives being pursued at that time.

Across all cases, rewards and consequences based on performance measurement was new, weakly enforced or not enforced at all. In DN and SL, government employees could not be removed from office. While ostensibly employees could lose their annual increment in wages if they fail to perform in SL, informants could not remember an instance when such an increment was withheld. In BR and BW, informants said that there were no consequences for non-performance. In MR, performance measures were in the process of being introduced by leaders at some functional agencies, but was not consistently applied across government.

	BR	BW	DN	SL	MR
Capacity Building Framework	No matching of skills to roles, no clear staff development plan	No matching of skills to job roles.	No human resource planning. Training on political ideology and government structure	Framework for hiring staff into particular services with specialised skills. Examinations required for seniority based promotions.	No capacity building framework. Training may not be conducted without the context of a project.
Skills development and retention processes	Staff sent for training not based on needs, but on seniority	No finding	Project specific, as part of NSO project.	Suggestions of bias in staff selection for training	Project specific, as part of ID project.
Measurement of Performance and Measurements and KPIs	No performance measures, no consequence for non-performance	No consequence for non-performance. Not clear if measures are monitored.	KPIs tend to measure activity rather than outcomes. Leaders and middle managers complain of abuse.	Not consistently applied, and no consequences for not meeting targets.	Measurements specific to project. Not consistently applied across government.
Appointment of Personnel	Appointments made to avoid conflict	No finding	Government does not fire employees. Personnel may be appointed in places where there is no need. Unclear appointments process.	Government cannot fire employees. Appointments made based on seniority not competence.	Appointments made on criteria other than competence.
Framework for hiring, deploying and training ICT personnel	No finding	No. Hiring done by both CAICT as well as functional ministries	In the process of outsourcing technical work to private sector.	Newly created Accountants appointed as IT staff, pay not competitive with private sector	Through parastatal

Table 26 Factors affecting skills development and retention

In four out of the five cases, appointments of staff to various positions, or promotions of staff were not made on the basis of competence or ability to perform. In the case of BW, no finding was made because informants did not discuss this matter. Reasons for appointing employees to various positions include: avoidance of conflict and prevention of disaffected officers from “rebellious”; placement of non-performing officers in inconsequential positions since they could not be fired, but also could not perform their jobs; contacts and political connections; and seniority in terms of years of service.

Because there was not an instance amongst the five cases where performance was measured, and appointments were made on skills and competencies, it is difficult to definitively point to these factors as contributing to the lack of skills development and retention. However, the lack of management and leadership focus on performance and competence certainly would not have given government officers any incentive to increase their ability to perform.

Policies on how ICT personnel were managed appeared to be in flux in BW and DN. In BW, technical personnel were sometimes hired by line ministries and sometimes by the CAICT. It was not clear why this distinction was made, and how resources were to be obtained or deployed in the case of an e-Government project. In DN, the government had recently embarked on a policy to buy services from private sector firms, rendering the status of ICT personnel within government uncertain. SL had recently created a scheme of service dedicated to ICT personnel. While the scheme of service provided a clear progression path for ICT personnel, it is unclear whether they are able to retain the best talent within the government as pay was significantly lower than what was offered in the private sector. MR had the clearest model for the management of ICT personnel, with the CAICT providing project management, and a parastatal or private enterprises providing development and maintenance services. Technical officers were then hired through the parastatal. This model allowed for clear roles between the CAICT and functional agencies during e-Government implementation.

In summary, across the five cases, no formal capacity building framework matching job skills to roles, or directing training for government officers were found to be consistently practiced. Training which was project-based successfully transferred relevant functional skills to government officers in two instances. However, training was not always targeted at relevant personnel. Across all five cases, it did not seem to matter if government officers performed their jobs well, and appointments and promotions were based on factors other than skills and competencies. As a consequence, there did not appear to be an incentive for officers to increase their abilities.

6.6 Cross-Case Summary

Environmental factors such as the lack physical infrastructure, and a combination of institutional arrangements, organisation structures and processes, and lack of skills combined to generate poorer outcomes like delayed implementation, poor procurement outcomes and vendor disputes. Skills gaps in management and leadership competencies, such as setting directions and establishing project objectives, mobilising resources, and leading change delayed e-Government implementation. Skills gaps in establishing new processes and in technology management and implementation, such as project management, procurement and data governance also contributed significantly to delayed implementation and unclear value in ICT procurement.

Across the five cases, institutional arrangements and organisation structures and processes did not appear to provide incentives, or guide relevant officers to obtain skills and competencies. No frameworks existed to match skills to job roles. Measures of performance were seldom used to reward or punish. Appointments were made on the basis of factors other than competence or potential to perform the job role. Selection of personnel for training was varied, and not always based on job needs.

The next Chapter examines how skilled actors affected the process of enactment, through perception, performance and improvisation, and sensemaking.

Chapter 7 Skills and Competencies in the Process of Enactment

As noted in Section 3.1.2, the Technology Enactment Framework accounts for many of the phenomena in enacting e-Government, including constraints posed by organisations and institutions. However, it does not explicitly account for skills and competencies of the actors in the enactment process. In addition, it does not account sequence of activities and the different actors and stakeholders that are involved at different points in the process of e-Government implementation.

In order to extend the Framework, it was proposed that skills and competencies were sufficiently important to merit a separate construct (See [Figure 7](#), Section 3.3.1), and that a supplementary model accounting for the sequence of activities in enacted e-Government implementation would be necessary (See [Figure 8](#), Section 3.3.1).

This chapter examines the processes by which skills and competencies affect enactment, and the importance of various skills throughout the enactment process. In the first section, data from the cases is used to refine the *a priori* supplementary model (See [Figure 8](#), Section 3.3.1) which divided process of implementation into three phases. In the following three sections, the cases are reviewed for instances where skilled actors have enabled different outcomes in each of these phases. At the same time, the skills and competencies of these actors are identified in the context of those already identified in the IS literature (See [Figure 1](#), Section 2.4.4). Section 7.5 consolidates these findings and introduces a model that accounts for skills and competencies throughout the process of enacting eGovernment implementation.

7.1 Enacting e-Government Implementation in Developing Countries over Time

In Section 3.1.4, models of the process of e-Government implementation and enactment were examined. Drawing on literature from IS, e-Government, and institutional theory, an initial model was developed (See [Figure 5](#), Section 3.1.4) which divided the process into three phases: the Formation Phase, when the organisation identifies and assesses projects; the Development Phase, when the technology is acquired and constructed; and the Operations Phase, when the technology is put to use and incorporated into the worklife of the organisation. The period to be studied in each case was delineated by the time projects are identified and assessed for their applicability to the organisation (Heeks 2006; Swanson & Ramiller 2004) to the time when new ICT-enabled routines are first incorporated into the worklife of the organisation (Swanson & Ramiller 2004; Chan et al. 2011; Robey & Sahay 1996).

In examining the five cases, it was observed that the process of acquiring and enacting information technology in developing countries follows a fairly predictable path similar to those described by Heeks, Swanson, Chan et al., Robey and Royce (See **Figure 5**, Section 3.1.4).

In today's context, many governments do not develop systems from scratch with in-house resources, but rather procure available systems or services from IT vendors. In the cases, the stakeholders who were involved after a vendor was appointed to develop the system differed from those before the vendor appointment. Similarly, once the system was deployed into operations, a much wider group of actors within the government agency were involved in operating the system. To account for this, the initial model was refined so that the two dividing points for the three phases were the point at which the ICT vendor is appointed, and the point at which the system was put into use.

In the Formation Phase, goals or objectives are articulated by senior managers (cases MR, DN). Funding may be sought from sources external to the country (cases SL, MR, DN). In many instances, preliminary parameters of the objective technology are laid down by drafting terms of reference (TOR) for the technology vendor. These TOR are often drafted by external consultants (cases BR, DN), or by vendors themselves (case MR). These TOR may make reference to established or negotiated e-Government policy frameworks (case BR) or may not (cases SL, BW). In some instances, competitive bidding is initiated (cases DN, SL) and a vendor chosen after some evaluation. In others, procurement is made through direct negotiations with a single vendor (case MR).

In the Development Phase, detailed analysis is conducted on the requirements of the system usually with officers and vendor personnel developing a common understanding of requirements (cases DN, MR). A period of time is spent installing, developing or customising the technology, before it is put to use (cases DN, MR). The IT vendor will then work on the localisation of the software installation. Data not stored in digital form, or data stored in digital form on existing systems may need to be moved into the new system (case MR). Process changes and organisational transformation may take place in the government agency. In case DN, changes were introduced to forms and procedures for enumerators collecting data in the field. In MR, changes were made to roles of officers, including the assignment of custodians of data, and rules around who can amend and update data. Towards the end of the Development Phase, the functional staff in the government agency may need to be trained to operate the new IT system (cases DN, MR), and the technical staff of the government agency may need to be trained on how to maintain the IT system (case DN). In this phase, the primary actors come from both the government agencies as well as the IT vendor.

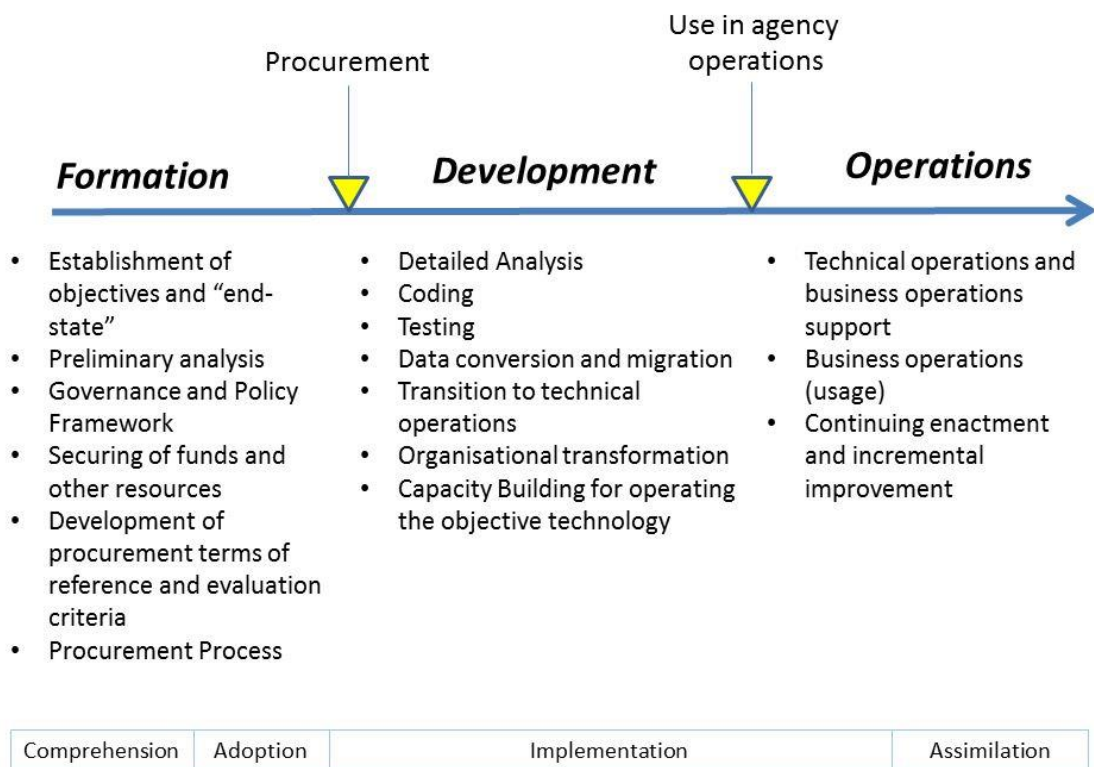


Figure 16 e-Government Implementation in Developing Countries

In the Operations Phase, the system is put to use. The functionality of the IT system is appropriated by the functional staff of the government agency, and made relevant to the organisational context (cases DN, MR). Technical support staff, sometimes from an IT vendor, provides technical assistance in the operations of the system. It is not uncommon at this point for technical or other issues to surface at this point. These may be remedied through technical solutions or further innovations to structure and routines. For example, in case DN, paper data collection forms were sometimes damaged by water on the way to processing centres. In case MR, slow system performance led to unacceptable crowds at card issuing centres. In both instances, process changes were made to address the issues. Continuing support and training may be provided to end-user personnel (cases DN, MR). In this phase, the primary actors come from the functional staff of the government agencies, the IT vendor, and the wider public.

Figure 16 illustrates the activities in each of the three phases of e-Government implementation in developing countries. The next three sections will examine how skilled actors affect enacted e-Government implementation outcomes in each of these phases.

7.2 Skills and Competencies in the Formation Phase

In the Formation Phase, competencies in envisioning a clear end-state, setting clear goals and directions, mobilising appropriate personnel, funds and other resources are essential in getting projects organised to the point where meaningful ICT acquisitions can take place. This is the process of sensemaking described by Weick (Weick, Sutcliffe & Obstfeld 2005), and the processes of comprehension and adoption described by Swanson and Ramiller (Swanson & Ramiller 2004). It involves noticing and categorising particular phenomena, labelling them, communicating with and amongst members of the organisation, and deciding on concerted action. Skills and competencies for facilitating such a process of sensemaking would include general management competencies identified in the IS literature such as strategic planning, and organisational design and transformation (Leitner 2006; Hunnius & Schuppan 2013; Krishna 2005). Sensemaking is also required in conceptualising and changing operational processes, and individuals equipped with operational knowledge and an understanding of technology's potential are more likely to conceive of transformative processes (Mundy, Kanjo & Peter 2001; Parrado 2005).

Technology management competencies in the area of technology strategy, procurement, vendor and contract management are also important to the ICT acquisition process (Parrado 2005; Settles 2005; Hunnius & Schuppan 2013). During this phase, governments typically prepare terms of reference for ICT vendors, and are then required to evaluate proposals put forward by the vendors. The ability of government officers to make these evaluations determine the objective technology, and so the path of the enacted technology.

7.2.1 Sensemaking and Technology Management in the Formation Phase

Sensemaking is one of the first steps towards collective action (Weick, Sutcliffe & Obstfeld 2005). In order for the new routines around the technology innovation to be adopted and institutionalised, "there needs to be an organising vision that is developed very early on, and that is preset throughout the process." (Mignerat & Rivard 2009, p. 387). The inability to make sense and create a common understanding of the environment, to communicate and organise members inhibits e-Government implementation.

In BR, one leader (BR2) noted that difficulties in mobilising the right staff members hindered project implementation. He acknowledged the lack of sufficient communication:

"... we don't engage them face to face, to tell them what is in it for them. Because we want to tell them it's a win-win for both and for Country BR as a whole. But we don't do that enough. We just send a letter."

In BW, leaders expressed uncertainty in how to go about implementing e-Government projects, resulting in multiple goals and unclear objectives for project teams. Project managers also complained of misaligned interests between sponsors, project managers and team members, because of multiple stakeholders. One leader in BW (BW6) expressed the lack of clarity in objectives:

“Well, the challenge now is that, because we are at the initial stage of development. First is lack of knowledge, we have the challenge of what it is that has to be done.”

In SL, the implementation of the new revenue systems was supposed to raise tax revenue. However, it was not clear how the implementation of a new ICT system would raise tax revenue, since the cause of low tax revenues was not clearly articulated, and it was not clear how a new ICT system would address this issue. In contrast, in DN-NSO and MR, where ICT systems were eventually brought into operation, leaders expressed specific, measureable goals – increased data accuracy, and reduced processing times for DN-NSO, and increased data accuracy and the issuance of new identity cards in MR. These goals were linked to the functional objectives of the respective agency. Project teams were eventually organised that included all necessary stakeholders.

“It was self-initiated and during the feasibility study um they gave their inputs to the consultants for the feasibility study and from there they actually identified three big areas for NSO to start on the modernization program and these three big areas actually really became the basis of their entire procurement plan.”

[DN07, Technical Advisor, DN-NSO]

“We want a database that is up to date but we have real time information whenever any agencies or department or any governmental institution want any kind of information, we can give them accurate and real time information.”

[MR06, Implementation Team member in MR]

But sensemaking extends beyond high-level statements of eventual outcomes. In order to produce Terms of Reference (TOR) for ICT vendors, some level of detail of future routines and processes must first be conceived. These would not only include statements like “closing all counters” (Chan et al. 2011), but also detailed documentation of the desired features of the ICT system (Robey & Sahay 1996). The process of communication and documentation is part of making sense, perhaps not only of the current state, but also of possible future states of the organisation.

Attempting a description of future organisational routines requires the conception of such routines. Skilled actors, who understand current routines, the opportunities brought about

by technology, and who are capable of performing a wider variety of actions are more likely to create or improvise new routines that are truly transformative (Robey & Sahay 1996; Feldman 2004). These process design and conceptualisation skills and competencies have been identified as hybrid (Mundy, Kanjo & Peter 2001) or cross-cutting skills (Parrado 2005).

A combination of the lack of process design skills, and procurement skills surrounding systems specification contributed to poorer implementation outcomes. The lack of ability to envision and describe an ICT-enabled process made specifications for ICT systems difficult. In BR, informants noted that systems design do not always take into account functional agencies' needs, and procured systems did not always meet requirements. In DN, projects not run by the NSO focused mainly on the procurement of hardware. In SL, and BW this led to delays in implementation.

"Sometimes we pick a solution but we don't understand the full implications until it is installed, then we find that it doesn't completely meet our requirements."

[BR4, Project Leader in BR]

"Then one of the challenges that we have, was the process re-engineering, because we have a number of processes that are delivering a variety of services ... we need to come out with a process that will lead us to the integration of the services."

[BW6, Government Leader in BW]

In DN-NSO, new ICT-enabled processes were conceived, sometimes with the assistance of external experts, prior to procurement of the ICT system, and system implementation. In the case of MR, vendors defined new processes, and adaptations were made as the project progressed. *"...consultants to do the current state analysis, then consultants even to do consultancy projects like process improvements or even BPR or even IT planning. Then from this consultancy studies then they will identify IT projects and the budgets for the IT projects."*

[DN07, Technical Advisor in DN]

In the area of technology management, procurement skills surrounding justification of ICT investments and assessing vendor solutions are also necessary in this phase. While projects were delayed in SL, primarily due to institutional arrangements around investment and procurement, informants indicated that lack of these skills also contributed to the delays. In DN, lack of skills in developing feasibility studies and justification for investment also contributed to implementation delays for projects not managed by the NSO. These feasibility studies would have to include the ability to conceive new processes discussed above, and the justifications for investment would be an extension of the sensemaking required to mobilise organisational resources. Without these studies, identified as part of the process of adoption by Swanson and Ramiller (Swanson & Ramiller 2004), the technological innovations could not be legitimised and adopted.

“A lot of money, but cannot do a feasibility study. Cannot get it done. Project preparation done by the senior management, manager level.”

[DN05, Project Leader in DN]

In MR, end-state operating models between the government and the ICT vendors were not clearly understood during the Formation and Development phases. Vendor disputes arose because their roles in the eventual operating model were not clearly articulated. Nonetheless, process design and management skills exercised by the third project director in making modifications allowed some major project objectives to be met. Arguably, some of these vendor disputes could be avoided had a clearer conception of the operating model been defined prior to procurement.

7.2.2 Summary

In the Formation Phase, management and leadership skills in setting objectives, gathering the necessary resources, envisioning and designing end-state processes, are central to the development of an e-Government project. These sensemaking activities are necessary to mobilise and organise the independent actors in the organisation (Weick, Sutcliffe & Obstfeld 2005). The general management competencies in this area include strategic planning and leadership, organisational design and transformation, which would include effective communication (Leitner 2006; Hunnius & Schuppan 2013; Kalu 2007). Skilled actors help in process design, conceptualising new routines or adapting old ones to take advantage of the technological features (Mundy, Kanjo & Peter 2001; Parrado 2005). Technology management skills surrounding investment and procurement are also essential in this Phase of implementation (Leitner 2006; Settles 2005; Hunnius & Schuppan 2013).

7.3 Skills and Competencies in the Development Phase

In the Development Phase, in addition to process design and organisational transformation competencies, project management and technical skills come to the fore (Mundy, Kanjo & Peter 2001; Parrado 2005; Hunnius & Schuppan 2013; Leitner 2006; Al-Fakhri et al. 2008). Many detailed decisions concerning the exact tasks needed for implementation, the timing of such tasks, and knowledge of how to perform them become important (Swanson & Ramiller 2004). The need for sensemaking continues as improvisations and new routines are enacted. In addition, technical skills are necessary in the performance of routines required to create the objective technology.

Only the cases of DN-NSO and MR reached Development Phase. In this phase, process design progressed beyond the initial conceptualisation to the improvisation and enactment of

new routines in anticipation of new technology. At this stage, new job roles may also be defined. Actors tend to shape their job, in part to exert control over their work (Wrzesniewski & Dutton 2001) Actors who are skilled or who are confident in their ability to control and perform their new tasks are more likely to design jobs incorporating ICT.

7.3.1 Sensemaking and Improvisation in the Development Phase

New routines were conceptualised and experimented with during the Development Phase. Job roles were also defined as part of these new routines. The need for sensemaking in this phase continued, and change management and communication plans were put in place and implemented during the Development Phase in both these cases. Changes to processes were documented and communicated to functional officers, and both classroom and on-the-job training were provided. Informants in MR reported greater engagement by functional officers after change communication workshops were held.

In DN-NSO, enumerators had to change the way they wrote and collected the data on paper; processing officers had to put in place a process to digitise the data; and analysts had to create new routines for producing reports from the ICT system. New job roles were also articulated. By introducing proposed changes ahead of the actual implementation of the ICT system, project managers allowed for learning and facilitated the sensemaking process in the organisation by allowing for discussion and feedback in non-stressful conditions.

“We introduced revised forms before the system was implemented, and standardized the way characters were written. Detailed instructions on how to use the new forms were issued, including what kind of ticks [✓] should be used on the survey form. Roles and responsibilities were written down and distributed. Process steps were also written down and distributed.”

[DN09, Processing Officer in DN-NSO]

In MR, new process designs were introduced by vendor experts in parallel with software development and implementation. This included routines to ensure data accuracy and fixing inaccurate records; processes for collecting necessary evidence for proof of identify; and processes for manufacturing and issuing new identity cards. Change communication sessions, although limited, were held by the vendor project management office, with the assistance of an external technical advisor, to communicate changes and gather feedback on changes.

“... he coached me a bit how to run but I think the people benefitted because they felt included. They felt, they understood more ...”

[MR02, Project Leader in MR on technical advisor and change communication]

In the two cases where ICT systems were put into use, experienced project managers were brought in to manage implementation. Project managers play an essential role in sensemaking. They are tasked to make an assessment of the environment and resources, identify all the tasks required to create the objective technology, and to develop a plan for the completion of such tasks. This process involves reducing the complex organisational environment into words and categories, and communicating this to all stakeholders – essential components of sensemaking and organising (Weick, Sutcliffe & Obstfeld 2005).

In the case of DN NSO, the government officer in charge had previous project management experience, although not on so large a scale. He was assisted by external experts. In the case of MR, the first project director lacked the relevant experience, was unable to identify all the necessary development tasks, and implementation was delayed. The project director was substituted with another who had the experience in implementing large scale software systems, and put the project back on track.

“I think the, from first director to second director, complaints against first director was he was not present that much on the ground and he was more of a, he was the sales guy, he was the business development guy. Anyway the second person was an excellent program manager, project manager. She was managing a part of the, one of the tracks, did really well you know, knows how to manage a timeline, excellent ...”

[MR02, Project Leader in MR]

7.3.2 Perception and Improvisation in the Development Phase

Skills also affect perception of events and problems. This phenomenon has been observed in crises literature, and we know that people with a higher capacity to act tend to see more events (Weick 1988), while specialized experts may develop a restricted view of the actual situation (Perrow 1984). Actors may also shape their job role and the cognitive perception of their job, in order to assert control over it (Wrzesniewski & Dutton 2001). The specialist focus of some of the technical managers affected the way problems were perceived, their perception of their job role, and hence, the proposed solutions.

In attempting to repair the extensive flaws in citizen data in MR, one technical manager devoted substantial resources to developing a software program to fix formatting errors. However, problems with the data were extensive, extended beyond formatting, and required enormous resources to resolve. Managers from the vendor also argued with the government over whether the vendors should be responsible for correcting such errors, and were attempting to limit their job role to only a technical solution. After some intervention by the government of the country from which the vendors originated, they agreed to a solution proposed by a data

governance expert put forward by that government's representative entity. The solution included human resource intensive investigative processes involving outreach programmes to citizens to determine the accuracy of the data.

"A computer program, produced to automated data correction, was not well received. This was because it could only correct formatting errors, but could not resolve the discrepancies involving relationships with records from different databases (birth records and marriage records, for instance). As such, it did not meet the expectations of the government."

[MR03, Project Leader, Data Governance in MR]

7.3.3 Performance and Technical Skills in the Development Phase

Technical skills are also important in this phase (Leitner 2006; Parrado 2005; Al-Fakhri et al. 2008). Vendor personnel need to be able to perform routines required to create the physical or objective aspects of the technology. In the case of MR, lack of technical skills in information architecture, data management and programming skills to write specialised software to discover and fix data errors, impeded the progress of the project. This was, however, corrected when the vendor consortium brought in an expert in the area, and added two programmers with the right skills.

"At the beginning of the data cleansing process, the technical staff of SV was unable to write the scripts (small computer programs) necessary to extract categories of flawed records. I had to devote a lot of effort in training them on how to do this, and checking the quality of their work. This made overseeing the entire process very challenging, as I had to supervise the work, but be involved in the technical intricacies as well. This became better after two people from PV who had the requisite skills joined the team."

[MR03, Project Leader, Data Governance in MR]

Competencies in data governance and management were also necessary in DN-NSO. In that case, data standards were developed late in the Formation Phase, and used in the Development Phase to localise the ICT system which was procured for statistical collection. The development of these standards allowed data to be collated and shared across the different provinces in DN.

"Meta-data definition would be useful to share data across provinces. There were no standards before. Now using [Local name for data standards] as a standard for terms and definitions across provinces."

[DN01, Senior Leader, DN-NSO]

7.3.4 Summary

In other cases, the main projects under investigation had not reached development at the time of the investigation. The cases of DN NSO and MR, however, provide some evidence that process design and organisational transformation competencies (Mundy, Kanjo & Peter 2001; Hunnius & Schuppan 2013) remain important in the Development Phase. The need for sensemaking continues as improvisations and new routines are enacted. Skilled actors are more likely to perceive the wider context of issues in the enactment process and propose novel routines to address those issues. Project management, data governance and technical skills (Parrado 2005; Leitner 2006; Al-Fakhri et al. 2008; Hunnius & Schuppan 2013) become more important as the physical aspects of the objective technology are constructed.

7.4 Skills and Competencies in the Operations Phase

Only the projects in DN-NSO and MR managed to reach the Operations Phase. In the Operations Phase, when the ICT system is put to use, the general ICT literacy and the functional ICT skills – the ability to use the ICT system designed to support the functional roles, become important for government officers in their functional roles. New routines continue to be enacted, some of which are now ICT enabled. Some of these novel or improvised routines may fail, generate crises, and government officers may be called upon to create new routines to replace them. Sensemaking processes may be created to manage responses to these crises, and these may become routinised. Vendors will also need to be managed in their support of the newly installed ICT system, and a clear model for continuing adaptations may need to be established. New routines may be assimilated into the worklife of the organisation (Swanson & Ramiller 2004).

7.4.1 Perception, Performance and Improvisation in the Operations Phase

End-user skills are necessary for the performance of new routines that now involve technology. The capture of new ICT by the organisation depends in some part on the ability actors in the organisation to perform these new ICT-enabled routines. ICT literate government officers are more likely to transit to the use of these functional systems (Chen & Thurmaier 2008; Chou, Chen & Pu 2008), but a concerted effort to develop these skills will also facilitate successful implementation (Braa, Monteiro & Sahay 2004).

In the case of DN-NSO, functional ICT skills were developed towards the end of the Development Phase, and on-going support to continue skills development during operations was provided. The skills were demonstrably transferred when officers were able to subsequently perform data collection and processing for multiple surveys without support from experts.

“In the beginning the major challenge was that we were not fully able to manage and understand the functionality of the system. We did not understand how to use it. The [vendor] expert conducted two to three training sessions for us over few months, and after the training we were provided with online support by the expert during the data collection. After two years, and the first survey was completed, we were able to do the subsequent surveys by ourselves.”

[DN08, DN09, IT Processing Officers in DN]

In the case of MR, functional ICT skills were also developed towards the end of the Development Phase, but not all government officers were put through the training process. Thus, not all officers were ready to adopt and perform the new ICT-enabled process.

New routines were conceived, and ostensive aspects communicated and performative aspects carried out in close conformance to the conception in both DN and MR. Some of the conceptual and design work was carried out during the development phase (See 7.3), and tested with early versions of the ICT to be eventually deployed. However, on-the-ground realities also forced adaptations and improvisations of these new routines.

In DN-NSO, enumerators used paper forms to collect census data. These forms were then transported to one of three central processing centres to be digitised. However, forms sometimes suffered from water damage during transit and could not be scanned by the ICT system. Two improvisations were attempted. In the first, data was transcribed from the damaged forms. However, institutional norms on data accuracy brought about a second change that required processing centres to reject such forms.

“In the early days, some of the first survey forms were too dirty. They suffered from water damage during transport from the provinces to the processing centre ... These forms could not be processed by the automated system. Initially, the data from damaged forms were keyed in manually through a keyboard. However, to preserve the integrity of the data, it was later decided to ask that the forms be recompleted and resubmitted, so that they could be scanned in their original form.”

[DN09, IT Processing Officer in DN]

The ability to make adaptations and improvisations to routines depends to some extent on the skills and competencies of the actor making or proposing the changes. Skilled and competent actors perceive the situation more accurately (Weick 1988), and are able to propose a wider variety of changes to routines that they are able to perform (Feldman 2004; Robey & Sahay 1996; Orlikowski 2000), sometimes drawing on past experience of other routines (Weick 1998). This was evident in the case of MR.

In MR, three project directors were appointed through the course of the project. The first project director lacked experience in ICT project implementation, delayed implementation, and had to be substituted (See 7.3). The second project manager put the implementation back on track, but when the system was put into operation was unable to deal with the operational crises that developed. When the ICT systems were put into operation, old paper ID cards had to be converted to new chip-enabled ID cards. More than 900,000 cards had to be issued in about a year. This created significant operational and logistical problems. Processing was slow and huge crowds formed at processing centres. People would wait in line and not reach the service counters before the end of the business day. Card conversion rates were low, and it was clear that targets would not be met.

“from micromanagement to the macro management, ... it was a step up for her ... there’s the you know numbers in terms of registration, people getting the cards so that creates a factor ... then you’re asking the [vendors] what’s your strategy, what’s your plan, what will you do. And then they’re not able to answer.”

[MR02, Project Leader in MR on the performance of the second project director in the Operations Phase]

A third project director, with extensive experience in managing business operations was brought in. He almost immediately observed that slow processing times were caused not just by technical performance of the ICT system, but also by the operational routines that were put in place. Documents such as birth certificates of all applicants had to be scanned as part of the new card issuance processes. However, this slowed down processing, and the process was subsequently modified to scan only certificates which had discrepancies with official records. This improvisation introduced by the third project director doubled the processing capacity at each of the processing centres.

“So they change the way, the step-by-step ... Into ... the scanning completely went out. They question the reason for scanning, and to some extent was tough because government wanted to keep the scanning, it was like a security in some ways, but basically we broke the process into two, one called straight through, so ... if you come in there’s no discrepancy in your records, cause they check my physical records against what’s on the system, everything matches, there’s no need for me to scan my documents.”

[MR02, Project Leader in MR]

As can be seen from the two cases, improvisation is not uncommon in the enactment of technology. Skilled personnel are better able to perceive the current environment accurately, and introduce novel changes to routines and processes. These changes may include modifications of actions by current actors, or the creation of an entirely new emerging action pattern (Deken et al. 2016). As described by Feldman (Feldman & Pentland 2003) these novel routines are then evaluated and selectively retained by the organisations, becoming part of their

ostensive routines. The competencies in managing operations are not directly identified in the IS literature, but are part of the hybrid (Mundy, Kanjo & Peter 2001) and cross-cutting skills (Parrado 2005).

7.4.2 Sensemaking and Operations Management in the Operations Phase

Sensemaking continued to be important in the operations phase, but the focus shifted from organising for e-Government implementation, to solving operational problems and resolving current 'crises'. Crises such as overwhelming crowds are not uncommon (Chan et al. 2011), especially in the initial period when the ICT system is first introduced.

In MR, the third project director introduced new routines to facilitate sensemaking. These included daily reports on the status and availability of personnel operating the conversion centres, daily meetings to identify problems and allocate resources to solving them, the use of log books to trace customer complaints. These routines increased the perception of control and decreased stress. Decreased stress leads to a greater ability to perceive and manage the environment (Weick 1988). Some of these routines, such as the use of log books became institutionalised and remained in effect beyond the close of the project.

"the relationship of the team ... was amazing and that probably did a lot because there's that comfort that you know you can ask and it's okay ... we had these meetings every, in the beginning probably at the end of every day but afterwards once a week where everyone of us comes back together and says their bit ... And it's interesting because whatever is happening, operations on the ground, I will have heard about it ... and the person looking after this systems would have had an inkling because ... if that was the cause of the problem someone would have contacted her and ... she knows there's an issue there, you see it reflected on the ground, you see it reflected from the citizens and ... so that was nice to see, the actual linkages ... properly working."

[MR02, Project Leader in MR]

"... the command center we had a log. The log right, so when we receive a call, what action was done, is the status active, terminated, is it closed, or open. And ... this log ... we didn't have it before, how to monitor, how to check ... it was a [Vendor personnel] who told us how to, how to monitor ... How to have full control on the program ... So the tracking is important."

[MR06, Implementation Team member in MR]

Turning the state of readiness of card operations centres and the state of operations into words and categories, and the daily communication meetings are all part of the process of sensemaking. The third project director, more experienced in business operations recognised the need for sensemaking routines immediately and introduced them. In contrast, the second project director was at a loss as to how to approach the problem.

7.4.3 Technology Management in the Operations Phase

The lack of skills and competencies also affected performance in the operations phase.

In MR, the lack of a clear support model for the new ICT system led to continuing disputes amongst vendors and between vendors and the government. The roles and responsibilities between the vendor and the government were not clear, and government officers were reluctant to take custody of technical equipment and operations of the new ICT system. The cost and nature of technical support from the vendors were also in dispute. By the end of the investigation period, these disputes had yet to be resolved. These disputes and lack of a clear model of support had their roots in the procurement and agreements drawn up in the formation phase. The lack of procurement and technology management competencies led to less than ideal outcomes. In contrast, DN-NSO which had the assistance of an external procurement expert in the development of vendor contracts had a much clearer support model.

7.4.4 Summary

In the Operations Phase, functional ICT skills are required to perform routines incorporating the ICT systems, operations management competencies are required to make process adaptations, and vendors need to be managed in their provision of on-going technical support. Skilled and competent actors are better able to perform routines in close approximation to their ostensive aspects. They are also better able to perceive the current environment, propose novel changes to routines that are relevant to the situation, and even introduce necessary sensemaking routines.

7.5 Skills and Competencies in Enacted e-Government

Implementation: Experiences from Developing Countries

7.5.1 Perception, Performance and Improvisation, and Sensemaking

eGovernment, when properly implemented in developing countries, can have a truly transformative effect on their administrations. However, the incorporation of ICT into the administration requires a diverse variety of new skills and competencies throughout the organisation (See 2.4). Skilled actors are required to design and perform new routines; perceive root causes of issues and improvise at short notice when new routines don't work as planned; and make sense of a complex, dynamic environment with many moving parts. **Table 27** provides an illustration of how skilled actors impact e-Government implementation through its different phases. The examples are drawn from those discussed in Sections 7.2 through 7.4.

In the Formation Phase, sensemaking is important to organise and mobilise the organisation for e-Government implementation. In the two cases (DN-NSO, MR) where implementation proceeded to the Development and Operations Phases, clear goals were set. DN-NSO engaged external experts to develop plans and detailed conceptions for implementation. In MR, goals for the new ID card had been set for some time, and the project had a long history of aborted implementations. With the assistance of a foreign government, detailed conceptions for implementation were made. In contrast, in other cases, leaders had difficulty in articulating goals (BW, SL), conducting feasibility studies (DN) or mobilising the right personnel (BR). The inability to make sense and organise delayed implementation in these cases. In MR, the lack of clarity in the required support from ICT vendors created unclear agreements. These subsequently led to disputes with the vendor after the project was completed.

In the Development Phase, the ability to perceive the current situation, and perform and improvise routines became important. In the case of MR, a skilled data governance expert was able to identify root causes of missing data and propose process-based solutions to the satisfaction of the government of MR. In contrast, a more technically inclined member of the team saw the problems as mainly with data formats. He then produced software, to fix formatting problems, which was not well received. Technical specialists in MR, lacking the requisite skills were unable to perform routines creating programs to find data inconsistencies, and had to be replaced by more appropriately skilled employees. In DN-NSO, after processing officers were trained in the use of the ICT system, they proceeded to design new routines that incorporated the use of ICT, and defined new job roles and responsibilities in anticipation of these new routines. Sensemaking continued, but moved towards organising project resources necessary to create the objective technology, and enacting new ICT-enabled processes. The first project director in MR did not have sufficient expertise in managing a large e-Government implementation project, and was unable to describe what was required, and put together a workable plan. He was subsequently substituted by a second project director. Guided by external experts, change communication sessions and workshops were instituted in both DN-NSO and MR to continue the process of sensemaking and garnering support for the new ICT-enabled routines.

In the Operations Phase, the second project director in MR, skilled primarily in technology implementation, was not able to identify non-technical causes of slow processing times, or propose strategies to cope with large crowds that developed. The second project director was replaced by a third project director with extensive experience in managing business operations. The third project director was almost immediately able to perceive problems with the new ICT-enabled routines, and propose innovative changes that doubled processing

capacity. He was also able to enact sensemaking routines such as status reports, the use of log books, and daily meetings that increased the project team's confidence in managing the crisis over large crowds. Functional ICT skills are also important in this phase as end-user operators must perform the new ICT enabled routines. On-the-job training and support was useful in developing the end-user skills necessary for performing the new routines in DN-NSO.

In summary, skills and competencies affect the enactment of technology by affecting actors' perceptions of the environment (Weick 1988), the performance and improvisation of routines (Feldman 2004; Orlikowski 2000; Robey & Sahay 1996) and the sensemaking necessary for organising collective action towards a common outcome (Weick, Sutcliffe & Obstfeld 2005). The need for sensemaking is necessary throughout the process of e-Government implementation, but the focus shifts from mobilising the organisation, to organising project resources, to solving operational issues as the project progresses from Formation through Development and into Operations. Perception, performance and improvisation become more important in the Development and Operations phases as new routines are invented, tried out and discarded or retained. Skills are also required in the performance of routines necessary to create the objective technology during Development, and in performing new routines incorporating ICT during Operations

	Formation	Development	Operations
Perception and assessment		Technical manager unable to perceive root causes of missing data and desired end state. Resolved by introduction of data governance expert (MR).	Second project director not able to identify other, non-technical causes of slow processing times. Resolved by introduction of third project director with relevant experience (MR).
Performance and Improvisation		Technical staff unable to perform routines to create scripts (short programs) for searching database for inconsistent data. Resolved by the introduction of skilled programmers (MR). Trained processing officers design their own routines incorporating the new ICT, and define new roles and responsibilities (DN-NSO).	Initial difficulty in operating ICT system by operators, resolved by on-the-job training and support (DN). Third project director introduces new innovations to proposed routines for card issuance, doubling processing throughput (MR).
Sensemaking	Goals set and targets set. External experts used to facilitate development of processes and detailed conceptions of operating models (DN-NSO, MR). Projects proceeded into Development Phase, and subsequently into Operations. Unable to set goals or make sense of how to proceed (BW, SL, DN). Unable to mobilise personnel (BR). Implementation delayed. Technology support models in operation not properly conceptualised (MR). Vendor disputes arose during Operations Phase.	First project director unable to identify all development tasks and put together a workable project plan, delaying project. Resolved by introduction of second project director (MR). Change communication sessions introduced by external experts (DN-NSO, MR). Support obtained for new operating models.	Third project director introduces sensemaking routines and communications processes. Provides confidence and reduces stress in the face of crisis (MR).

Table 27 Impact of Skills in e-Government Enactment

7.5.2 General Management Competencies, Technology Management and Technical Skills, and End-User Competencies

The various skills and competencies necessary for e-Government implementation have long been discussed in the IS literature (See 2.4), but have not been placed within the enactment process. These skills and competencies affect the enactment process through the spectrum from sensemaking through perception, improvisation and performance of routines. The various categories of skills and competencies — general management competencies, technology management competencies and technical skills, and end-user skills and competencies — become more important at different points in the implementation process. [Figure 17](#) illustrates the relative importance of the various skills and competencies in the phases of e-Government implementation as discerned through the case studies.

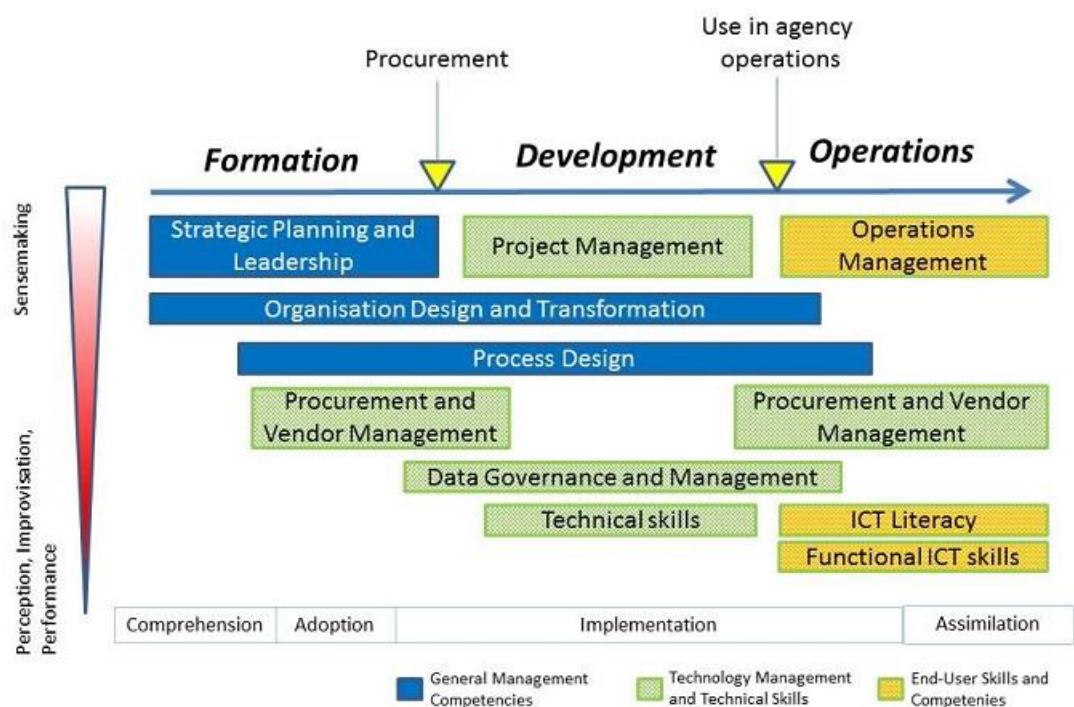


Figure 17 Phase Model of Skills and Competencies in Enacted e-Government Implementation (PMSC eGI)

General management competencies required for sensemaking and mobilising the organisation are key in the Formation Phase (cases DN-NSO,MR). These would include strategic planning and leadership, and organisational design and transformation, including effective communication (Leitner 2006; Hunnius & Schuppan 2013; Kalu 2007). Skilled actors with hybrid or cross-cutting skills in process design are more likely to conceive of transformative ICT enabled routines and include these into terms of reference for the vendors (Mundy, Kanjo & Peter 2001;

Parrado 2005; Hunnius & Schuppan 2013). Sensemaking efforts around communication, and hybrid skills in process design surrounding process design, as well as competencies in organisation design and transformation (Parrado 2005; Mundy, Kanjo & Peter 2001) remain important in the Development Phase. During this phase, new routines and improvisations continued to be defined at the working level, and new roles and responsibilities were also set out (cases DN-NSO, MR). Refinements to business routines are also made in the initial stages of the Operations Phase in response to on-the-ground realities when the new routines are first introduced (cases DN, MR).

Technology management competencies and technical skills come to the fore in the Development Phase. Making sense and organising project resources through project management (Hunnius & Schuppan 2013; Settles 2005) become more important as the construction of the objective technology takes place. Technology management skills surrounding investment and procurement were also essential in the Formation Phase of implementation (Leitner 2006; Settles 2005; Hunnius & Schuppan 2013). These included the need to perform feasibility studies (case DN), articulate terms of reference for vendors (cases DN-NSO, MR), and develop comprehensive agreements with vendors which take into account the agencies' needs for long term technical support. In the case of MR, the disputes arose with the vendor during the Operations Phase due to the lack of a clear support model in agreements struck in the Formation Phase. Vendor management competencies are therefore also important in the Operations Phase in order to find effective solutions for both the vendor and the government agency. Skills in Data Governance and Management (Braa et al. 2007; Parrado 2005) became important in the latter part of the Formation Phase, as portions of it affected the terms of reference for vendors supplying the ICT system in DN-NSO. These skills also became increasingly important in the Development Phase as the objective technology was being created, as standards for data sharing and routines to ensure the integrity and accuracy of data collected were enacted (cases DN-NSO, MR). In the Operations Phase, some of these routines around data accuracy were modified (case DN-NSO). Technical skills (Al-Fakhri et al. 2008; Leitner 2006; Parrado 2005) around coding became important in the Development Phase in the case of MR, where a skills gap complicated the repair of damaged data.

End-user skills and competencies become important primarily in the Operations Phase. Sensemaking progressed towards managing unexpected crises in operations in the case of MR, and operations management competencies were required to make sense of the situation and introduce process adaptations. While operations management competencies were not directly identified in the IS literature, they form part of cross-cutting and hybrid skills (Mundy, Kanjo & Peter 2001; Parrado 2005). General ICT literacy and functional ICT skills (Braa, Monteiro & Sahay

2004; Kumar & Best 2006) are required to perform routines incorporating the ICT systems (cases DN-NSO, MR).

The list of skills and competencies is by no means comprehensive, but are those found as possible causes of poorer outcomes, or expressed as missing by informants. The findings from the case studies affirm the previous results, but they also provide greater insight into the sequencing of when these skills and competencies become important in the process of enactment.

It is important to note that the model does not suggest that competencies such as planning and leadership are only important in the Formation Phase, or that technical skills are only important in the Development Phase. The model only suggests that if these skills are present in their respective phases, better outcomes are more likely.

In summary, different skills and competencies become more important at different points in the process of e-Government implementation. General management competencies necessary for sensemaking and organising are important in the Formation Phase, as are technology management competencies in procurement and investment. Technology management and technical skills become more important in the Development Phase, although hybrid and cross-cutting skills remain relevant as new routines are tried out. In addition, end-user skills and competencies are important during the Operations Phase in order to perform the new ICT-enabled routines. Operations management competencies will also help in adapting these routines to unexpected or changing circumstances when they are enacted.

7.6 Summary of Skills and Competencies in the Process of Enactment

Skills and competencies do affect e-Government implementation outcomes. Skilled human actors can facilitate sensemaking (Weick 1988; Swanson & Ramiller 1997) necessary for organising e-Government efforts; perceive situations more accurately (Weick 1988); improvise new and modify existing routines (Weick 1998; Wrzesniewski & Dutton 2001; Orlikowski 2000) to incorporate ICT; and perform new ICT-enabled processes.

The proposed model of e-Government Implementation in Developing Countries allows for analysis of skills requirements at different points in the enactment process. It also allows for finer theoretical development, by identifying the different actors and stakeholders at different points in the enactment process.

Sensemaking is necessary throughout the enactment process, from the initial mobilisation of the organisation, to the detailed planning for implementation, and to assessing and responding to operational realities once the ICT is put to use. During Development and Operations, skilled actors are better able to perceive the actual situation and improvise novel routines to address issues. They are also better able to perform routines required to create or install the objective technology.

Skills and competencies necessary for this enactment process have long been identified in the IS literature. General management and technology management competencies are needed for sensemaking during Formation. Technical skills and hybrid process design skills become important during Development as the objective technology is created, and details of new routines are articulated. End-user, operations management and vendor management competencies become relatively more important as the ICT is used in Operations.

In the next chapter, we will return to the *a priori* theoretical lens and discuss the implications of the findings.

Chapter 8 Discussion and Implications

At the beginning of this study the following questions were asked:

- 1) a) How do skills and competencies (F4) affect the enacted e-Government implementation (D) in developing countries? And b) How do Environmental Factors (F1), Institutional Arrangements (F2), and Organisational Structures and Processes (F3) influence skills and competencies in developing countries?
- 2) How do skilled actors influence e-Government implementation outcomes through perception, performance and improvisation, and sensemaking?
- 3) Which skills and competencies become important at different points of the enactment process?

Chapter 7 has addressed questions 2) and 3) by demonstrating how skills and competencies affect the enactment process through skilled actors who perceive differently (Weick 1988), are better able to perform routines or improvise new routines (Feldman 2004; Orlikowski 2000; Robey & Sahay 1996), and who can facilitate sensemaking and organising (Weick, Sutcliffe & Obstfeld 2005). The skills of these actors were also identified in the context of skills already identified in the IS literature (See 2.4). Different skills and competencies become important at different points in time.

This chapter returns to question 1), the Technology Enactment Framework, and discusses the role of skills and competencies in the context of national and institutional barriers. Other implications for theoretical development which are outside the scope of this study are highlighted. Implications for skills development and public policy in developing countries intending to implement e-Government are then presented.

8.1 An Extension to the Technology Enactment Framework

The first research question prompted the introduction of a new construct into the Technology Enactment Framework and explored the relationships (labelled 1 to 4 in **Figure 7**, Section 3.3.1) between the new construct and existing constructs. Chapters 5 and 6 analysed the case data with respect to these relationships. In this section, the findings will be examined in the context of the *a priori* model. The emergent model (see **Figure 18**) summarises the findings: that both organisation structures and processes and the enacted technology affect and are affected by actors' skills and competencies, and that institutional arrangements impact the development and retention of skills and competencies. No evidence was found in the five cases that environmental factors had significant impact on skills and competencies, and how skills and competencies affected institutional arrangements was not demonstrated.

Findings from the study showed that general management competencies in management and leadership, strategy and planning helped to set up projects with clear outcomes in DN and MR. In BW, BR and SL where the leadership struggled with this, resources could not be mobilised and implementation was delayed. The ability of leaders to lead and organise change – usually through a process of sensemaking – turning organisational circumstances into words and categories (Weick, Sutcliffe & Obstfeld 2005) affects leads to better implementation outcomes. Skills in process design, procurement, project management, and facilitated a structured and well-planned implementation at the National Statistics Office (NSO) in DN. In MR injection of project management, data governance and technical expertise allowed the project to accomplish some major objectives. These hybrid, technology management competencies and technical skills not only allow for sensemaking during the development phase implementation, but also allow for the creation of the objective technology and the improvisations to routines (Orlikowski 2000; Robey & Sahay 1996) that lead to the transformative adoption of technology. However, a lack of understanding of the scope and current state, together with poor procurement and vendor management competencies resulted in many vendor disputes in MR when the ICT system was put into operations. These findings provide evidence that individual skills and competencies affect e-Government implementation.

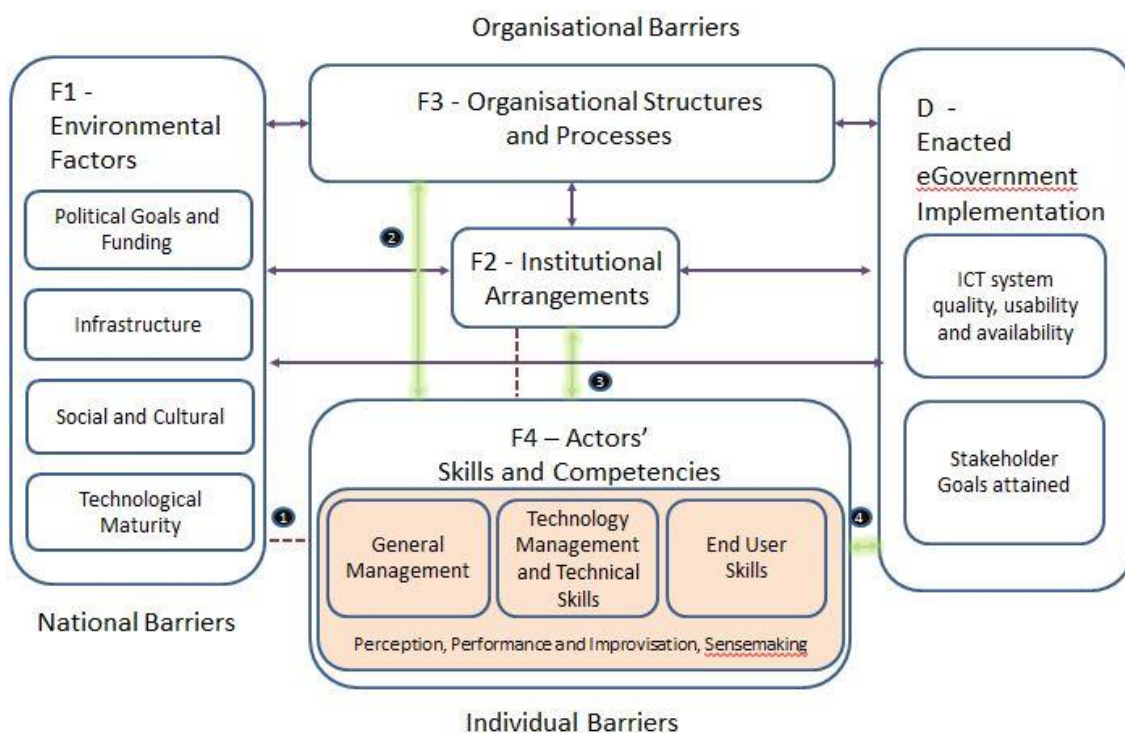


Figure 18 Actors' Skills and Competencies in Enacted e-Government Implementation (Emergent)

The choice of technologies and what was eventually enacted, also affected the skills and competencies within the agencies. The skills and competencies that are affected through the choice of objective technologies primarily surround end-user skills and competencies, and technical skills for employees required to maintain the function of the objective technology. For instance, in DN-NSO, because the optical scanning and character recognition was used to process paper forms, enumerators who collected data for census were required to write numbers in a clear and standardized manner. Technical staff who had previously been trained to support another system provided through a donor agency had to be reskilled. In MR, CID officers learnt how to operate fingerprint scanning devices, look up databases to verify citizens' identity, and issue new cards with the new software system. Skills in managing processes surrounding data integrity and management were also transferred. These skills and competencies affected the employees' ability to perform the new routines that incorporated the objective technology. Skilled employees are better able to perform the new routines in a manner which approximates the new ostensive routines.

These findings indicate that relationship 4 is most likely a bi-directional relationship – that is, that skills and competencies affect, and are affected by technology implementation.

In the cases where ICT was eventually put into operations, changes in functional processes also took place. Officials changed data collection instruments and processes in DN-NSO, and with the assistance of vendors, new functional processes surrounding card production, issuance, document management, and transmission of information were put in place in MR. In both cases, process changes were clearly documented and communicated to functional officers. It did not seem to matter if the expertise came from within the government or without, provided the skills for process design and change management were found within the project team. Where process re-engineering and procurement skills were identified as lacking, in BW, SL, and some organisations in DN, delays in implementation were found, or implementation was limited to hardware and infrastructure.

Organisational processes surrounding appointments of personnel, rewards for performance and staff selection for training did not seem to incentivize the development and retention of skills and competencies. In all cases, staff appointments were not made on competence or ability to perform. There was little use of performance measures, and in the instances where they were in use, there was little consequence for non-performance. Officers of DN and SL pointed out that state employees could not be fired. Functional skills training in DN and MR did not seem to occur outside the context of the e-Government project, and criteria like seniority and other considerations were used to select staff for training in BR and SL. There

is limited variation across the five cases to provide strong evidence that organisational structures and process affect skills development and retention. However, there appears to be some evidence that current practices affect skills and competencies as they do not create an incentive for individual officers to develop skills, and do not direct training at appropriate officers.

These findings indicate that individual skills and competencies in the project team can affect and change organisation structures and processes, and processes surrounding staff appointments, performance measurement and training can affect skills development within the agencies implementing e-Government. Relationship 2 is also likely to be bi-directional.

Institutional arrangements around the role of the Central Agency for ICT (CAICT) also affect engagement models with functional agencies, and the hiring and deployment of skilled ICT personnel. In DN, technical staff were hired directly by the functional agency, and in MR, technology management fell to the CAICT and development work to a parastatal. Because the roles were defined and accepted by all stakeholders, DN-NSO was able to reskill technical staff to support the new system, and MR CAICT was able to hire and insert an experienced project manager provided in the midst of the project. In cases where ICT personnel were hired by both functional agencies and the CAICT, like BR and BW, responsibilities for developing and bringing skilled personnel into the government were less clear. In SL, leaders express concern that pay scales for ICT personnel in government are not competitive with the private sector, and therefore inhibit the retention of skilled personnel in government.

No evidence was found that skills and competencies affected institutional arrangements in the five cases. Perhaps it is because institutional changes take place over a longer time frame than the study period, or are more affected by other factors.

These findings indicate that institutional arrangements can affect the development, retention and recruitment of skilled personnel within the government, and relationship 3 is uni-directional.

No strong evidence was found that environmental factors affected the skills and competencies within the government across the five cases, and this relationship has been removed from the emergent theoretical framework.

These five cases show strong evidence that skills and competencies affect e-Government outcomes, and can facilitate changes in organisation structures and processes necessary for government reform. Thus, it should be explicitly considered as a factor when examining technology enactment in government and merits consideration as a separate construct in any e-Government framework.

8.2 Other Implications for Theoretical Development

The findings from the study also have theoretical implications beyond skills. In particular, the concepts of institutional arrangements and objective technology within the Technology Enactment Framework may need to be refined in the context of developing countries. The PMSC eGI also provides a framework for analysis of the enactment process over a period of time.

The concept of institutional arrangements in the enactment process for developing countries may need to be expanded. Fountain originally intended that institutional arrangements include those surrounding the government agency, and perhaps the government context in which the agency is situated. This study finds, however, that institutional arrangements of external actors such as International Development Banks (IDBs) can also play a significant role. In particular, because of IDB requirements to avoid conflicts of interest (World Bank 2011), it is often the case that consultants drafting the terms of reference for procurement are different from the vendors installing or constructing the ICT system, as in the case of DN. In the case of SL, institutional requirements on procurement from the IDB constrained the choice of technology, and delayed implementation. In the case of DN, IDB procurement standards broke up large programmes into many small projects. In order to achieve success, the government would then have to acquire the ability to understand interdependencies between the projects, and to integrate the outputs of the projects into a coherent whole. Extra-governmental institutional restrictions, such as those from IDBs can affect the trajectory of the implementation effort by: increasing the number of actors, constraining the choice of technology or extending implementation timelines.

The impact of external actors cannot be overstated in the enactment process in developing countries. As observed by Heeks (Heeks 2005), IDBs, consultants, IT vendors all bring their own contexts and values to the enactment process. Systems procured by developing nations also embody the cultural values and objectives of their designers (Shields & Servaes 1989). In some instances, technology choices also embody political decisions, and alter the form and quality of human associations (Winner 1980). The use of biometric identification data, for instance, greatly increases the ability of the government to monitor the activity of its citizens, and automatically implies greater control by those already in power. Therefore, it is unclear if the “objective technology” deployed in developing countries is entirely objective. When technologies created in developed countries are implemented in the context of a developing nation, clashes values, contexts or objectives may lead to failure achieving implementation goals. In the case of MR, functionality and data involving biometric identification was discarded

after implementation, because, as one senior government leader put it “We are not yet ready for this in MR”.

The PMSC eGI allows for a finer analysis of the enactment process in developing countries. It allows researchers to discern the different stakeholders and participants, as well as the varying influences of institutional arrangements and other factors at different points in the enactment process. It posits a sequence of activities that more closely models the enactment process in developing countries whose governments are more likely to procure technology. These characteristics make it a relevant tool in understanding the enactment process in developing countries.

Orlikowski (Orlikowski 1992) argued that, because the development of technology often occurred in one organisation at one point in time, and the use of that technology occurred in a different organisation and at different points in time, technology was sometimes incorrectly treated as a closed object or product – a “black box”. She suggested instead that the objective aspects of the technology are modifiable throughout its existence. Human interaction with the technology would then fall into two tightly coupled, iterative modes: the design mode, and the use mode.

The PMSC eGI incorporates and extends these ideas. Within the PMSC eGI, both modes would feature in all three phases, with the design mode more heavily weighted in the Formation phase, and the use mode more heavily weighted in the Operations phase. However, it is important to note that the actors in each phase are different, and enactment is not a binary interaction between actors in the government agency and the technology. As highlighted earlier, consultants drafting the terms of reference for procurement are often different from the vendors installing or constructing the ICT system. In some instances (DN), consultants drafting the terms of reference in the Formation Phase continue their participation in enactment through the Development and Operations phases. In others (BR, SL), the government agency is left to deal directly with technology vendors. These consultants and vendors are also participants in the enactment process, and their influence should be considered in any analysis of the enactment process in developing countries.

This study, therefore, suggests several areas of further work. The impact of institutional arrangements of external actors such as IDBs may need to be more closely examined, as should the impact of values and objectives incorporated into the technology procured by developing countries. Understanding how the interests of consultants and IT vendors are incorporated into the enacted technology is also important – so that perhaps, implementation failure due to

contextual or cultural incompatibility may be avoided. The PMSC eGI provides a framework for analyzing where in the enactment process these influences might have their greatest effect.

8.3 Implications for skills development and public policy

The PMSC eGI and the findings from this research suggest a few actions in the area of capacity building that could help developing countries implement e-Government projects.

- 1) *Target senior and middle managers first.* In BR, BW and SL, which were still in the Formation Phase, it was found that leaders sometimes lack sufficient knowledge of what is necessary to implement e-Government projects. Answers to strategic questions like “What should be done?” and “Why should we do it?” are seldom well-articulated, or articulated only in general, non-measurable terms. In the case of SL for instance, it was “to raise tax revenue”. However, senior leaders were unable to explain how implementing ICT would raise tax revenue, seemingly taking it as an article of faith.

In the case of BW, leaders expressed a lack of knowledge of “how” to do it, lacking a step by step guide on: how to set goals; organise a team; allocate appropriate resources; specify requirements after envisioning an end-state, develop vendor contracts and so on.

Without this understanding, e-Government projects fail to gain sufficient traction to reach the Development Phase. Capacity building efforts should therefore focus first on assisting leaders on strategy, and both leaders and middle managers on the “how”. Other skills that become important later on in the implementation cycle: ICT literacy, functional ICT skills can be developed subsequent to this, and in parallel with other development and implementation activities.

- 2) *Focus on on-the-job training.* Formal degree programmes in technology and computer science provide a strong theoretical foundation, and frameworks with which to analyse problems. Professional certification programmes ostensibly guarantee a minimum standard of competency and field experience. However, some of these programmes currently certify participants solely based on classroom training. Classroom training cannot provide the context in which the participant is supposed to perform his work. As a result, technology and functional managers in BR, BW have often found that project managers or other “trained” technical staff are unable to perform up to expectations.

“There are a number of skills lacking. Project management, how to run a project. There is a lot of theories and frameworks. But people need to be trained “into use”, into knowing how to do the work, not for certificates.”

[BW4, Agency middle manager in BW]

In contrast, on-the-job training for functional ICT skills in DN-NSO and MR successfully transferred skills to government officers to the extent that they are able to operate independently of vendor experts.

In order to implement e-Government in a sustainable fashion, governments should consider how essential skills such as process design, project management, procurement, and information architecture can be transferred to their staff, and how they may be used repeatedly. On-the-job training for officers in these areas should be a component of e-Government projects, and should be considered in all three phases of implementation.

- 3) *Hiring experts can enhance delivery but skills development and retention remain the responsibility of the government.* Skills and competencies take time to develop. To address the immediate skills gaps, it is possible to hire external experts to support government officers. In DN-NSO and MR, a mix of skilled personnel from within and without government worked together to achieve positive outcomes. The NSO took full ownership over the on-going operations of the ICT system. Personnel were allocated to do work in the new operating model, and technical support officers were identified to work with vendors for continued support of the ICT system. However, this was not the case in MR at the time of the investigation, and vendors and project managers expressed concern about the sustainability of ongoing operations.

Process design, project management and procurement skills are to some extent transferrable across e-Government implementations. However, the governments examined did not have a way to retain these skills in a manner which allowed this to happen. In DN-NSO, where some of these skills might have been transferred, officers in the NSO are unlikely to be allocated to other agencies where any skills acquired may be practiced. In MR, no candidates were identified for the retention and dissemination of these skills at the time of the investigation.

Governments should consider developing a clear vision of end-state operations at the inception of e-Government projects. This will enable them to identify the required skills and competencies for continued operations, the candidates for new or modified job roles, and

develop a capacity building plan for sustainable operations. These plans should include how skilled personnel, a scarce resource, may be used across multiple agencies.

Besides skills and competencies, e-Government policy, also affects enacted e-Government implementation. If it exists, these policies can also drive technology selection (Cordella & Iannacci 2010) in the Formation phase. However, policies do not enforce themselves, and the strength of the institutions play a major role in the outcomes. In the case of BW, although an agency, DIT, was designated to monitor technology procurement, the process might have been complicated by the existence of other e-Government coordinating bodies. This suggests that prior to entering the Development phase, governance processes and the associated institutions should first be strengthened.

“That has always been the responsibility of the DIT department....They didn’t monitor it so well, to not to allow ministries to buy indiscriminately.”

[BW5, Government Leader in BW]

In the Development phase, e-Government policies and standards around information sharing become important in shaping the enacted technology. In the case of DN, data standards were established slightly ahead of Development phase, while in the case of MR, this was only established during the Development phase. As a consequence, extraordinary effort had to be put in by vendors and advisors in the case of MR in order to meet implementation deadlines. This suggests that such policies and standards should be established during the Formation phase.

In summary, capacity building should be considered ahead of any acquisition or procurement process, focusing sensemaking and developing an organisation specific understanding of how any technology innovation can be used. Leaders need to understand the how to implement changes to some extent, and training should be on-the-job. A clear conception of the end-state operations will help in implementing strategies for skills retention, reuse and transfer between government agencies. In addition, clear governance processes and data sharing standards should be established early, prior to the acquisition of technology.

8.4 Summary

The findings from the research provide evidence that while institutional factors can play an overwhelming role (case of SL), skills and competencies do affect e-Government implementation outcomes. Skilled human actors can: facilitate sensemaking necessary for organising e-Government efforts; perceive situations more accurately; improvise new and modify existing routines to incorporate ICT; and perform new ICT-enabled processes. This

affirms findings by previous authors, and suggests that a new construct should be inserted into the Technology Enactment Framework so that its effects may be explicitly accounted for in future research.

The study also suggests other areas where further research might add to theoretical development. In the context of developing countries, the impact of institutional arrangements of external actors such as IDBs may need to be more closely examined. As many developing countries procure their ICT from developed countries, the impact of values and objectives incorporated into the technology procured by developing countries should be better understood. Understanding how the interests of consultants and IT vendors are incorporated into the enacted technology is also important. Perhaps, in this way, implementation failures due to contextual or cultural incompatibility may be avoided.

From the standpoint of management and public policy, the findings from the cases suggest that because different skills become important at different phases in the process of enactment, sequencing skills and competency development may help in achieving better outcomes. Capacity building should be considered ahead of any acquisition or procurement process. Leadership training should focus on sensemaking and developing an organisation specific understanding of how any technology innovation can be used, and to some extent how to implement the necessary changes. While formal classroom education, and certification processes may be necessary to increase competencies, they are insufficient to address real-world situations, and therefore, governments should also place strong emphasis on on-the-job training. A clear conception of the end-state operations will help in implementing strategies for skills retention, reuse and transfer between government agencies. E-Government implementation is not just about putting in place and ICT system, but also about changing the way government officers work. Therefore, it is also necessary that measures be put in place to ensure that officers are skilled to work in the new model for the long term.

The following chapter discusses the study's limitations and summarises its key contributions.

Chapter 9 Limitations and Conclusion

9.1 Limitations and Opportunities for Further Study

This study focused on how skills and competencies impacted the process of technology enactment. An unrestricted opportunity was provided to informants in the cases to describe and identify the most important skills and competencies inhibiting their progress at their particular stage of enactment. This approach allows for a larger framework to be developed, which can be used to examine in detail how specific skills and competencies might affect the process of enactment. It was not the intention to derive an exhaustive list of skills and identify specifically how each skill would impact the enactment process. As a result, this approach leaves out many detailed skills and competencies, and indeed, the models derived do not include all the skills and competencies already identified in the IS literature.

Some practical limitations restricted the generalisability of the study. While there was some flexibility in case selection (See Section 4.2) countries in open or armed conflict were excluded, as were those where the risk of disease transmission was high. Nations under restrictive sanctions by the United Nations were excluded since access could not be obtained. No country in Latin America was included in the study, partly because of issues of language, and also of accessibility. It is possible that culturally or geographically specific factors may modify the conclusions of this study.

Nonetheless, the five cases in the study had characteristics that allowed the achievement of some degree of theoretical replication and tested the boundaries to which the refinements to the Technology Enactment Framework might be applicable. However, there was limited variation across the five cases in organisation structures and processes surrounding the appointment of personnel, performance measurement, and training. In all cases where data was obtained, personnel were appointed to various jobs and positions on bases other than skills and competencies required in their job roles. Performance was either not measured, or there were no consequences for non-performance, and training was not always targeted at developing skills relevant to the job roles of particular officers. While it can be argued that these practices do not provide an incentive for skills development and retention, the argument can be strengthened with a case or a more focused study that shows development and retention of skills over time when skills-focused processes are in place.

The study found that skilled personnel could introduce changes to organisation structures and processes and management practices. However, the extent to which these changes affected institutional norms and arrangements could not be determined. For instance,

data collection processes in DN were standardised across provinces to support the use of the ICT systems. Would this affect norms around data sharing across provinces? Would more readily available and timely information provided by NSO alter decision making practices within and across agencies? Would standardized practices for processes other than data collection be introduced and institutionalised? A study over a longer period might lend insight into how skills might affect the process of institutionalisation.

This study has also raised other topics not related to skills that merit further study. For instance, institutional arrangements surrounding procurement of external actors like IDBs seem to impose restrictions on technology choices (case SL). The impact of such arrangements might merit further study. The enactment process in developing countries may also involve the imposition of various values and interests alien to that country. Values and objectives are often incorporated into the technology procured by developing countries. In the case of MR for instance, the use of biometric identification required significant trust in government institutions. The interests of consultants and IT vendors may also influence technology choices in these countries. This creates an opportunity for further research into how the culturally compatible enactment of technology in developing countries can be achieved.

The Phase Model of Skills and Competencies in Enacted e-Government Implementation (PMSC eGI) was derived from a comparative study across the five cases. At the time of the study, three cases were in the Formation Phase (BR, DN SL), before an ICT vendor was appointed; and two cases were in the Operations Phase (DN, MR) where the ICT development was completed and the technology put to use. While the cases in the Operations Phase lent insight into activities during the Development Phase, no project had “failed” or had been abandoned during the process of development. The examination of a project which failed or was abandoned during the Development Phase may lend additional insights.

Other methodologies may also yield interesting insights into the process of e-Government enactment. In the case of SL, for instance, national cultural and institutional norms are sometimes in conflict with foreign requirements imposed by IDBs. An interpretive study may show how individual skills in navigating the complex environment may affect the enactment process. Quantitative methods could also be applied, as a survey across a larger number of developing countries, for example. This would give a better sense of the generalisability of the PMSC eGI, and the extent to which it reflects the enactment process across these countries.

In summary, conclusions on relationships surrounding the introduction of the new skills and development construct in the Technology Enactment Framework could be strengthened by: further work into the impact of organisation structures and processes surrounding staff

appointments, performance measurement and training; and longitudinal studies which are more likely to show the impact on institutional arrangements. The PMSC eGI could be strengthened with cases which did not make it through the Development Phase; and quantitative approaches which would increase its generalizability.

9.2 Conclusion

The objective of this study was to explore the roles that skills and competencies play in the process of e-Government implementation in developing countries. By doing so, this study aimed to lend insight to how skills and competencies can best be developed and retained to obtain better implementation outcomes. In carrying out this study, two major theoretical contributions were made. The first involves the introduction of a new construct into the Technology Enactment Framework, and the second, the addition of a process dimension in understanding technology enactment.

e-Government frameworks arising from institutional theory like the Technology Enactment Framework (Fountain 2001) do not explicitly account for the impact of individual skills and competencies on the outcomes and trajectory of the enactment process. From the IS literature, it has been established that many skills and competencies are necessary in order to successfully implement ICT (Leitner 2006; Parrado 2005; Schuppan 2010; Hunnius & Schuppan 2013; Settles 2005). These skills span the entire organisation, and are therefore a challenge to acquire. This is especially so in developing countries, where governments are more likely to move from entirely paper-based organisations to ICT-enabled ones.

Through case studies in five developing countries, it was shown that individual skills and competencies do impact on e-Government implementation outcomes. Skilled actors influence the outcomes of enactment through more accurate assessments of the situation (Weick 1988), creating different routines and schemas (Feldman 2004; Orlikowski 2000; Robey & Sahay 1996), and facilitating sensemaking necessary for organising and coordinating action (Weick, Sutcliffe & Obstfeld 2005). Individual skills and competencies are also affected through the process of enactment, through the choice of technologies, the institutional arrangements, and the organisational structures and processes of the agency undergoing the change. This suggests that e-Government implementation may be better understood by refining the Technology Enactment Framework through the introduction of a new construct that explicitly accounts for the impact of individual skills and competencies.

However, not all skills and competencies are important throughout the enactment process. e-Government implementation involves a sequence of activities carried out by different

actors and involving different stakeholders over time. By dividing the process of enactment in developing countries into three phases — the Formation Phase, prior to ICT procurement; the Development Phase, after vendors are called upon to implement the ICT system; and the Operations Phase, when the ICT system is put into use by the government agency — a finer analysis can be made on the impact of skills and competencies. The primary actors, stakeholders, and challenges in each of these three phases are different. Hence, the skills and competencies required in each phase are also different. The Phase Model of Skills and Competencies for Enacted e-Government Implementation (PMSC eGI) provides a framework for understanding skills and competencies necessary in each phase, and how they might help move the enactment process from one phase to the next.

In addition to theoretical development, the study also produced implications for public policy and management. Because different skills become important at different phases in the process of enactment, sequencing skills and competency development will allow better use of limited resources. Leadership should focus on developing an organisation specific understanding of how any technology innovation can be used, and on how to implement the necessary changes. Formal classroom training and certification may be necessary to increase competencies, but they are insufficient to address real-world situations, and therefore, governments should also place strong emphasis on on-the-job training.

The thesis and the frameworks developed provide the basis for further research into the role of skills and competencies in the enactment of e-Government. Possibilities include: longitudinal case studies to investigate how skills and competencies affect institutional arrangements, which are likely to evolve more slowly; and quantitative approaches which would then measure the relative impact of skills and competencies and other factors in e-Government implementation outcomes.

Appendix A – Data Collection Protocol

Theoretical Construct and/or relationship	Data Source	Evidential Observations	Possible Questions
1.1 Environmental conditions – Competing priorities and lack of funds	Interviews with government stakeholders: leaders and project managers Government documentation	Expressions of inadequate funding. Expressions of other priorities being more important. Documentary evidence of funding sought and denied.	What are the top three priorities for the government? How do e-Government initiatives fit into government plans over the next three years? Is there sufficient funding to implement the e-Government initiatives?
1.2 Environmental conditions – physical infrastructure, technological maturity	Interviews with government stakeholders: leaders and project managers, external vendors and users Government documentation UN Survey of e-Government Readiness	Expressions of need for security and privacy components Expressions of need for a payments system or reducing costs of executing payment transactions Expressions of need for a central database or of data sharing between government agencies and departments Expressions of connectivity or availability issues Rankings in e-Government survey on infrastructure readiness	Do you or have you used <i>specific e-Government project</i> ? Why or why not? Was it easy to use? Did you have any difficulty using it? How would you rate the ease of use on a scale of 1 to 10? Are there specific technology components that might help you in implementation?
2.1 Institutional Arrangements and Organisational Processes – Agency roles, institutional arrangements, and how they are enforced.	Interviews with government stakeholders: leaders and project managers, external vendors and users Government documentation	Existence and articulation of job roles and KPIs Expression of assessment mechanism and regular measurements Documentary evidence of above	Tell me about your job. Are roles defined clearly for each Ministry or Department? Are Key Performance Indicators set for each department manager? Are there consequences for not meeting KPIs and if so what are they?
2.2 Institutional Arrangements and Organisational Processes – Planning and procurement - Relationship between agency and CAICT	Interviews with government stakeholders: leaders and project managers Government documentation	Expressions of limited decision making power, or the need to defer to a central agency by individual agencies or departments.	How are investment decisions on e-Government Projects made? What decisions does the central agency (if it exists) make? How are the decisions enforced? What is the procurement process for e-Government systems? Who is involved in the decision to award contracts?

		<p>Documentary evidence of the existence of a formal/informal central coordinating body for e-Government implementation</p> <p>Documentary evidence of decisions to prioritise or combine procurement efforts across government departments or agencies</p> <p>Expressions of complex procurement process involving multiple parties. Expressions of inability to agree or obtain consensus, thus delaying the procurement process. Expressions of ineffective use of funds, or projects that remain incomplete after procurement contracts are awarded.</p> <p>Existence of documentation substantiating procurement decisions.</p>	Are the procurement decisions effective and value-for-money?
<p>2.3 Institutional Arrangements and Organisational Processes –Data Sharing – Architectural frameworks for integration and data sharing - Relationship between agency and CAICT</p>	<p>Interviews with government stakeholders: leaders and project managers</p> <p>Government documentation</p>	<p>Documentary evidence of a central architectural framework for information collection and storage, and data transfer protocols.</p> <p>Expressions or documentary evidence of processes to update such frameworks or protocols</p> <p>Documentary evidence of enforcement or control</p>	<p>How is the coordination and cooperation between government departments and agencies? Do government departments share information with amongst themselves? If so, how? If not, why?</p>
<p>2.4 Institutional Arrangements and Organisational Processes –Training and human resource management - Relationship between agency and CAHR</p>	<p>Interviews with government stakeholders: leaders and project managers</p> <p>Government documentation</p>	<p>Expressions of limited decision making power, or the need to defer to a central agency by individual agencies or departments.</p>	<p>How are staff skills and training decisions made? How are these funded? Is there a staff development plan? And if so, who is responsible for developing and implementing this plan?</p>

		<p>Documentary evidence of the existence of a formal/informal central coordinating body for e-Government implementation</p> <p>Documentary evidence of decisions to prioritise or combine procurement efforts across government departments or agencies</p> <p>Documentary evidence of enforcement or control</p>	
4.1 Skills –Basic IT Literacy, use of computing equipment	<p>Interviews with government stakeholders: leaders and project managers</p> <p>UN Survey of e-Government Readiness</p>	<p>Expressions of readiness or lack of expertise or willingness to use ICT.</p> <p>Human Capital sub-index and components ranking</p>	<p>What are the difficulties in implementing <i>specific e-Government project</i>?</p> <p>What kind of assistance do you need in implementing <i>specific e-Government project</i>?</p> <p>Do you feel that the government officers are ready to use ICT?</p>
4.2 Skills –General Management Skills	<p>Interviews with government stakeholders: leaders and project managers</p> <p>Government documentation</p>	<p>Expressions of presence or absence of cooperation between government agencies or departments.</p> <p>Expressions of presence or absence of cooperation by government employees or sub-ordinates.</p> <p>Expressions of need for coherent policy decisions or assistance in developing government policies.</p> <p>Documentary evidence of project managers with a track record of successful project implementation.</p>	<p>What are the difficulties in implementing <i>specific e-Government project</i>?</p> <p>What kind of assistance do you need in implementing <i>specific e-Government project</i>?</p> <p>Do you feel that the government officers are ready to use ICT?</p>
4.3 Skills – ICT specific technical and management skills	Interviews with government stakeholders: leaders and project managers	Expressions of presence or absence of knowledge about how to implement an e-Government system	<p>What are the difficulties in implementing <i>specific e-Government project</i>?</p> <p>What kind of assistance do you need in implementing <i>specific e-Government project</i>?</p>

	Government documentation	Expressions of presence or absence of specific ICT knowledge. Requests for assistance in project specifications, procurement, evaluation of vendor proposals and vendor management.	Do you feel that the government officers are ready to use ICT?
5.1 Success – use and usage, connectivity, reliability and other intermediate outcomes.	Interviews with users/ vendors/project managers (because of overlapping roles) Government documentation		Do you or have you used <i>specific e-Government project</i> ? Why or why not? What did you use it for? Was it easy to use? Did you have any difficulty using it?

Document sources sought

1. Government agency or cabinet papers on e-Government strategy, notes of parliamentary or legislative debates
2. Government organisational charts
3. Project funding papers (internal or presented to 3rd party funding agencies such as the World Bank, Asian Development Bank or Commonwealth Secretariat)
4. Project plans, notes of meetings, and documentation of intermediate deliverables
5. Post-project implementation reviews or evaluations

Interview sheet

Government Leaders: Politicians, permanent secretaries, local government or agency leaders

Environmental Factors

What are the top three priorities for the government?
How do e-Government initiatives fit into government plans over the next three years?
Is there sufficient funding to implement the e-Government initiatives?

Are there specific technology components that might help you in implementation?

Organisational Structure and Processes

How are investment decisions on e-Government projects made?
What decisions does the central agency (if it exists) make?
What is the procurement process for e-Government systems?
Who is involved in the decision to award contracts?
Are the procurement decisions effective and value-for-money?

How are the decisions enforced?
How are staff skills and training decisions made?
How are these funded?
Is there a staff development plan? And if so, who is responsible for developing and implementing this plan?

Institutional Arrangements

How is the coordination and cooperation between government departments and agencies?
Do government departments share information with amongst themselves? If so, how? If not, why?

Are roles defined clearly for each Ministry or Department?
Are Key Performance Indicators set for each department manager?
Are there consequences for not meeting KPIs and if so what are they?

Skills

What are the difficulties in implementing **specific e-Government project**?
What kind of assistance do you need in implementing **specific e-Government project**?
Do you feel that the government officers are ready to use ICT?

How are staff skills and training decisions made?
How are these funded?
Is there a staff development plan? And if so, who is responsible for developing and implementing this plan?

Interview sheet

Project leaders: Chief Information Officers, Project Directors, Project Managers

Environmental Factors

What are the top three priorities for the government?
How do e-Government initiatives fit into government plans over the next three years?
Is there sufficient funding to implement the e-Government initiatives?

Are there specific technology components that might help you in implementation?

Organisational Structure and Processes

How are investment decisions on e-Government projects made?
What decisions does the central agency (if it exists) make?
What is the procurement process for e-Government systems?
Who is involved in the decision to award contracts?
Are the procurement decisions effective and value-for-money?

How are the decisions enforced?
How are staff skills and training decisions made?
How are these funded?
Is there a staff development plan? And if so, who is responsible for developing and implementing this plan?

Institutional Arrangements

How is the coordination and cooperation between government departments and agencies?
Do government departments share information with amongst themselves? If so, how? If not, why?
Are roles defined clearly for each Ministry or Department?
Are Key Performance Indicators set for each department manager?
Are there consequences for not meeting KPIs and if so what are they?

Skills

What are the difficulties in implementing **specific e-Government project**?
What kind of assistance do you need in implementing **specific e-Government project**?
Do you feel that the government officers are ready to use ICT?
How are staff skills and training decisions made?
How are these funded?
Is there a staff development plan? And if so, who is responsible for developing and implementing this plan?

Outcomes

Do you or have you used **specific e-Government project**?
Why or why not?
What did you use it for?
Was it easy to use? Did you have any difficulty using it?

Interview sheet

End-users and Vendors: End-users, ICT vendor personnel

Institutional Arrangements

How is the coordination and cooperation between government departments and agencies?
Do government departments share information with amongst themselves? If so, how? If not, why?

Are roles defined clearly for each Ministry or Department?
Are Key Performance Indicators set for each department manager?
Are there consequences for not meeting KPIs and if so what are they?

Skills

What are the difficulties in implementing **specific e-Government project**?
What kind of assistance do you need in implementing **specific e-Government project**?
Do you feel that the government officers are ready to use ICT?

Outcomes

Do you or have you used **specific e-Government project**?
Why or why not?
Was it easy to use? Did you have any difficulty using it?
How has the work changed before and after the project?

Appendix B – Sources of Data

Case Code	Collection Period	Documents Examined	# Informants	Composition of Informants	Interview Length	Remarks
BR	February 2012 – July 2012	National Vision National e-Government Plans Project documentation from Steering Committee Meetings Organisation Chart	7	Govt Leaders – 2 Project Dir, Leaders – 3 Vendors, Users - 2	Between 25 and 65 minutes	
BW	July 2012 – December 2012	eGov Framework Document BPR Standard Operating Procedures BPR Study conducted by govt staff Partial notes of one project meeting Output of project discussions (in conjunction with field notes)	6	Govt Leaders – 4 Project Dir, Leaders – 2	Between 20 and 45 minutes	No end-users or vendors were interviewed because the projects had not reached the phases of implementation
SL	February 2013 – January 2014	e-Government Policy National Development Framework e-Government Progress Report 2011 Output of project discussions (in conjunction with field notes)	10	Govt Leaders – 3 Project Dir, Leaders – 4 Vendors, Users - 3	Between 15 and 35 minutes	
DN	March 2014 – March 2015	Assessment Report of Implementation written by consultants Project documentation produced by consultants	7	Govt Leaders – 2 Project Dir, Leaders – 2 Vendors, Users - 3	Between 30 and 60 minutes	Interviews generally longer due to need for translation
MR	October 2014 – March 2015	e-Government Plan Interim Study reports on ID Card implementation	8	Govt Leaders – 3 Project Dir, Leaders – 4 Vendors, Users - 2	Between 30 and 90 minutes	A second, follow-up interview was held with MR 03

Appendix B1 – Profile of Informants Case BR

Index Code	Classification	Profile
BR1	Government Leader	Senior policy maker for e-Government initiatives
BR2	Government Leader	Senior policy maker in a government ministry and IT user
BR3	Project Leader	IT specialist and project implementer and user of internal systems
BR4	Project Leader	IT manager and project leader for a government agency
BR5	External Vendor	Representative of overseas IT vendor
BR6	Project Leader	Project manager for government ministry and IT user
BR7	External Vendor	Representative of local IT vendor

Appendix B2 – Profile of Informants Case BW

Index Code	Classification	Profile
BW1	Project Leader	Process specialist and project implementer
BW2	Project Leader	Project manager and project implementer
BW3	Government Leader	Senior policy maker for e-Government initiatives
BW4	Government Leader	Middle manager in a government agency
BW5	Government Leader	Senior policy maker for government-wide capacity building agency
BW6	Government Leader	Senior policy maker in a government ministry

Appendix B3 – Profile of Informants Case SL

Index Code	Classification	Position
SL1	Government Leader	Senior policy maker for ICT initiatives
SL2	Government Leader	Senior policy maker in government agency being investigated
SL3	Project Leader	Project Leader in government agency
SL4	User	User of ICT within government agency
SL5	Vendor/User	ICT project manager, external vendor
SL8	Project Leader	Project Leader in government agency
SL9	Project Leader	Project Leader in government agency
SL10	Government Leader	Senior leader and manager in government agency
SL11	User	User of ICT within government agency
SL 12	User	User of ICT within government agency

Appendix B4 – Profile of Informants Case DN

Index Code	Classification	Position
DN01	Government Leader	Senior policy maker and leader in Statistics Office
DN02	Vendor/User	Project manager in ICT vendor
DN03	Government Leader	Senior policy maker in central agency for ICT standards
DN05	Project Leader	Project Leader, DN ICT project
DN07	Project Leader	Technical Advisor
DN08	Vendor/User	IT processing officer, National Statistics Office
DN09	Vendor/User	IT processing officer, National Statistics Office

Appendix B5 – Profile of Informants Case MR

Index Code	Classification	Position
MR01	Vendor/User	Project Leader
MR02	Project Leader	Project Leader in Project Management Office, from external vendor
MR03	Project Leader	Project Leader, Data Governance and conversion, from external vendor
MR04	Project Leader	Operations manager, and operations project leader, Government
MR05	Government Leader	Operations manager from functional agency
MR06	Vendor/User	Operations manager from functional agency, Implementation Team member
MR07	Government Leader	Senior policy maker from CAICT

Appendix C – Final Coding Tree

Name	Description
Skills and Competencies in e-Government Success	
D – e-Government Implementation	Enacted technology - features, and how users use the features. Objective and subjective outcomes. Success and Failure definitions as suggested by Heeks.
Enacted Technology	Technological Features, and how and what is used by the users. Evaluations of success.
Partial Failure	Major goals are not achieved, or major negative consequences result
Success	Most stakeholder groups attain their major goals without significant undesirable outcomes.
Total Failure	Not implemented; or immediately abandoned after implementation
Outputs and Outcomes	Efficiency, effectiveness, service quality, increased transparency, greater citizen participation
Delayed or lack of implementation	Delayed or lack of implementation of planned systems
Unclear value	Unclear value in technology procurement. Duplication or non-optimal procurement. Not value for money. Uncertainty on how procurement leads to intended outcomes
Usability	Degree to which deployed IT system meets the key needs of intended user groups
Connectivity and Availability	Connectivity and availability of systems
Ease of use	Ease of use by officers performing their functional role
Functionality	Whether the software has the functions necessary for the role of the operating units
Use	Usage levels and adoption rates. Reluctance by individuals to use ICT components in workplace.
Vendor disputes	Disputes with vendor over scope, whether outcomes meet with needs. Eventual delivery of sub-standard system or non-delivery of system.
Well implemented and adopted	In use by target user group. Consistent functioning. Improved service levels or service quality.
F1 - Environmental Factors	Technological Conditions, cultural conditions, political conditions economic conditions, demographics, GG p61.
Physical Infrastructure	Lack of Accessibility – intra-government connectivity, reaching remote areas, use of intermediaries in service centres, lack of appropriate hardware
Political Goals	Relative priority of e-Government to other goals. Whether funding is adequate.
Funding	Lack of funding for e-Government Initiatives, or expressions of adequate funding
Government Priorities	Relative priority of e-Government to other goals. Competing goals.
Social and Cultural Factors	Lack of trust between government and non-government stakeholders, Perception of time and need for consensus. General Literacy. Motivation.
General and ICT Literacy	General and ICT literacy in end-users or general population.
Lack of Trust	Lack of trust between government and non-government stakeholders that may inhibit usage or implementation.
Perception of time and Consensus	The need for consensus in decision making. Perception of time, sense of immediacy or lack thereof.
Technological Maturity	Availability of technological infrastructure and shared components across government.
Payment System	Means to pay for government services, levies and taxes through an online payment system.
Security and Privacy	Security and Privacy components, including mechanism to identify counterparties during and electronic transaction.
Working Database	Databases that record transactional and other data. Stored data on databases that can be used for cross-agency information sharing.
F2 - Institutional Arrangements	Laws, formal rules defining limits of powers, engagement between agencies. External influences such as legislative committees, agency power and charter, specific government programmes. Roles of central ICT and central HR agencies.

Other Institutional Arrangements	Laws. Interactions with other institutions or parts of government, including the Ministry of Finance or other budget agencies.
Role of Central Coordinating ICT Body	The role of the central or coordinating IT Body if it exists - in skills development and personnel allocation, in procurement, in establishing and enforcing standards, and others.
Framework for hiring, deploying and training ICT personnel	Institutional practices and considerations for hiring, deploying and training ICT personnel, including schemes of employment.
ICT Investment and Procurement Practices	Institutional practices surrounding approvals for funds and execution of procurement
Other Central ICT Practices	Other interactions with Agency. Decisions taken by central IT agency, and in coordination with functional agency.
Standards and governance structures	Presence of standards requiring conformity for interoperability, shared facilities, or adherence to overall strategy. Institutional structures and arrangements in the enforcement of such standards.
Strategies for e-Government Deployment	Portfolio Management Strategies, Delivery management and Operations Strategies, Change Management Strategies
Role of Central Hiring and HR Body	Role of Central HR body in provision of skilled personnel or training, institutional arrangements for the retention of skilled personnel determined or administered by Central HR body, other institutional arrangements
Capacity Building Framework	Framework that identifies job roles and skills needs, and provides planned training that matches training provisions with skills needs.
Other Central HR Practices	Other interactions with Agency. Decisions taken by central HR Body, and in coordination with agency.
Scheme of Service for IT	Existence and maturity of institutional arrangements for IT as a distinct speciality within the civil service.
F3 - Organisational Structures and Processes	Role clarity, norms on appointment or allocation of personnel, performance measures and enforcement, processes for skills development and retention. Project organisation structures.
Appointment of personnel	Process of selecting and appointing officers to specific job roles. Promotion of staff to senior positions.
Measurements and KPIs	Whether performance measures, such as Key Performance Indicators, or other forms of measurements are used to assess performance of government officers. Whether there rewards or consequences for either performing or not performing.
Project Organisation	Project Organisation Structure of the implementation of e-Government projects in general, or for a specific ICT project. Roles within project organisation. Role clarity between participants in projects, vendors and government officials.
Roles and Role Clarity	Role and functional definitions within agency, department or institution. Clarity of roles between government officers and government departments.
Skills development and retention processes	Training and skills development processes. Selection of personnel. Reassignment of personnel after training, if any.
F4 - Skills and Competencies	Presence or lack of General Management Competencies, End-User Competencies, IT Management skills and competencies, and technical skills.
End-User Competencies	Skills needed by officers in functional roles. Including general IT literacy, functional IT literacy (for use of systems specific to job role), and awareness of role in a wider whole-of-government context (necessary for single window operations).
Functional ICT Competencies	Ability to use ICT software specific to functional roles
ICT Literacy	ICT literacy of staff in agency or institution. Confidence in using computers.
Intra and inter agency awareness	Necessary knowledge for cross functional roles such as single window initiatives.
General Management Competencies	General Management Competencies not related to IT. Ability to organise, delegate, coordinate and integrate outputs and outcomes into a cohesive whole. Ability to manage transactional and other processes within the functional unit. Ability to lead and direct change, and garner necessary resources for change.
Management and Leadership	Ability to set clear goals and directions, identify and garner necessary resources, delegate tasks and integrate outcomes. Ability to manage transactional and other processes within the functional unit.
Organisational Design and Transformation Competencies	Competencies necessary to design and design an end-state organisation, and in moving from the current state to the desired state. This includes the design and adoption of new processes, organisational structures, technologies and leading the change and transition.
Change Management	Alignment, motivation and mobilisation of stakeholders. Enabling the adoption of new organisation and processes. Managing the direction and pace of change.
Process Design and Re-engineering	Understanding of current processes. Process design skills for new ICT enabled processes. New process implementation skills.

ICT Management Competencies and Skills	Alignment of ICT goals with agency goals. Skills in managing data, including standards for data sharing. Competencies in procurement and project management. Other general ICT management competencies.
Information Architecture and Data Management	Skills and ability to share data across government agencies, establishment and enforcement of common standards. Control over data quality, accuracy and timeliness.
General ICT Management	Alignment with organisational objectives, Strategy, Market Awareness, Ability to divide and reintegrate IT work. Other general ICT management competencies.
Procurement Skills	Skills to justify and evaluate procurement expenditure. Skills to identify and specify technology needs. Skills to buy technology that meets needs in a cost effective and sustainable manner
Project Management	Project management competencies. Ability to clearly envision end-state, break down tasks, assign appropriate resources, and solve problems arising in the course of the project. Manage stakeholders, resources and timelines.
ICT Technical Skills	Troubleshooting, ability to install software or hardware, coding, systems integration, database design, operational performance management, service levels and reliability.
Database Administration	Database design, operations, and data management skills.
Other Technical Skills	Troubleshooting, ability to install software or hardware, coding, systems integration. Technical skills that informants say are available in the agency or in themselves. Expression of lack of non-specific technical skills.

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