

UNIVERSITY OF KWAZULU-NATAL

**CHALLENGES OF GOVERNMENT-TO-GOVERNMENT e-
GOVERNMENT: A CASE STUDY OF KWAZULU-NATAL
DEPARTMENT OF TRANSPORT**

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Doctor of Philosophy**

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2015

DECLARATION

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ABSTRACT

e-Government (e-Gov) is the use of Information and Communication Technology (ICT) to enhance government service delivery to citizens. Government-to-Government (G2G) is a type of e-Gov concerned with the use of ICT within a government department or across different government departments. e-Gov is plagued by high failure rates and therefore faces challenges that inhibit governments from leveraging ICT to its fullest potential. Thus, the purpose of this study was to explore and understand e-Gov challenges, focusing on G2G in particular.

A qualitative research methodology was used, with a case-study research design. The research site was the KwaZulu-Natal Department of Transport. A conceptual framework comprising e-Gov and public management models and theories was used to interpret the data and reach conclusions.

This research has shown that departmental e-Gov policy and the e-Gov quality management framework are foundational requirements for successful implementation. The challenges facing G2G in the KZN DoT can be considered as three layers with various inter-relations between the layers. The outer layer of challenges (sub-themes of *strategy, usability, complexity, HR skills, resistance, systems development methodology, management support* and *data quality*) must firstly be addressed, followed by the middle layer of challenges (themes of *Addressing User Requirements, Business Process Management, Change Management, User Involvement, Organisational Culture* and *Priority*); once this has been achieved, the central challenge facing G2G (User Adoption) is likely to be addressed. User Adoption was found to be the central challenge facing G2G since the lack of user adoption means that the intended benefits of G2G cannot be realised. By addressing these three layers, challenges related to Technology Infrastructure are solved in the process, although various other underlying issues related to Technology Infrastructure were identified.

This research has addressed gaps in the literature on understanding the current challenges facing G2G as a particular form of e-Gov, and specifically how it is approached within a South African provincial government context. It has also bridged the gap between e-Gov and public management research, as each research domain has traditionally considered e-Gov independently. Finally, from a methodological perspective, this study contributes to the lack of qualitative research on e-Gov.

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TERMS AND ABBREVIATIONS

Application

An Information and Communications Technology (ICT) system that seeks to automate, streamline or enhance business processes or governmental services.

Application implementation

For the purposes of this study, application implementation encompasses the complete systems-development life cycle, including post-implementation support, maintenance and operations.

Benefits realisation

Benefits realisation is the identification, optimisation and tracking of the expected benefits from a business change in order to ensure that they are actually achieved (Hughes and Cotterell, 2009). Business change in the e-Gov context arises from the implementation of specific e-Gov initiatives.

Challenge

An e-Gov “challenge” for the purpose of this study increases the likelihood of failure or, viewed differently, reduces the likelihood of success.

e-Gov

e-Gov is the use of ICT to foster more efficient and effective government, improve public access to information, enhance accessibility to government services and make government more accountable to citizens (Farelo and Morris, 2006).

e-Gov categories

e-Gov efforts can be understood and categorised according to three broad categories based on the participants engaging in the e-Gov interaction or transaction: Government-to-Government (G2G), Government-to-Business (G2B) and Government-to-Citizen (G2C) (Brown and Brudney, 2001; Ndou, 2004; Presidential National Commission (PNC), 2012). G2C is concerned with making government services accessible to citizens using technology (e.g. online applications for renewal of driver’s licenses) whilst G2B is concerned with making government services accessible to business (e.g. online registration on a suppliers database) using technology.

G2G

A form of e-Gov concerned with inter- and intra-government transactions (Ndou, 2004; PNC, 2012). It concerns the information sharing, streamlining and automating of government services and processes within a government department (intra) or between government departments (inter).

Inter-government transactions encompass both horizontal and vertical transactions, i.e. they take place across different departments (e.g. the Department of Home Affairs, Department of Social Development and Department of Human Settlements), across spheres of government (e.g. national, provincial and local), and across the same type of department at different levels of government (e.g. National Department of Health and Provincial Department of Health in each of the nine provinces).

Public management

The system of structures and processes that operate within a particular societal environment, with the aim of formulating and efficiently executing appropriate governmental policy.

Abbreviation	Description
AGSA	Auditor-General of South Africa
BPR	Business Process Re-engineering
CAQDAS	Computer Aided Qualitative Analysis Software
CIO	Chief Information Officer
CITI	Cape Information Technology Initiative
CSIR	Council for Scientific and Industrial Research
DCIL	Durban Community Information Link
DHIS	District Health Information System
DoC	Department of Communications
DoT	Department of Transport
DEG	Digital Era Governance
DPSA	Department of Public Service and Administration
DTPS	Department of Telecommunications and Postal Services
ECM	Enterprise Content Management
e-Gov	e-Government
eNaTIS	Electronic National Traffic Information System
G2C	Government-to-Citizen

G2G	Government-to-Government
G2B	Government-to-Business
GIAMA	Government Immovable Asset Management Act
GITOC	Government Information Technology Officers Council
HANIS	Home Affairs National Identification System
HISP	Health Information Systems Programme
HSRC	Human Sciences Research Council
ICASA	Independent Communications Authority of South Africa
IFMS	Integrated Financial Management System
ICT	Information and Communications Technology
KZN	KwaZulu-Natal
KZN DoT	KwaZulu-Natal Department of Transport
MIOS	Minimum Interoperability Standard
NAAIRS	National Automated Archival Information Retrieval System
NPM	New Public Management
PERSAL	Personnel Salary System
PFMA	Public Finance Management Act
PGITOC	Provincial Government Information Technology Officers Council
PM	Public Management
PMG	Parliamentary Monitoring Group
PNC	Presidential National Commission
PNC-ISAD	Presidential National Commission on Information Society and Development
PSA	Public Service Act
QDA	Qualitative Data Analysis
QOS	Quality of Service
RFP	Request for Proposal
RTMC	Road Traffic Management Corporation

SANRAL	South African National Roads Agency Limited
SARS	South African Revenue Services
SITA	State Information Technology Agency
URS	User Requirements Specifications
WAN	Wide Area Network

CHAPTER 1

CONTEXT OF E-GOVERNMENT AND OUTLINE OF STUDY

This chapter introduces the concept of e-Government (e-Gov), explains why it is beneficial to government and citizens, and presents some of the challenges it faces. e-Gov is then contextualised in South Africa, by describing the government and the e-Gov landscape. To provide further context, the status of e-Gov in South Africa and KwaZulu-Natal (KZN) province is examined. Thereafter public management is introduced, with an emphasis on its relationship to e-Gov and the applicability of public management to this research.

This gives rise to the problem statement, research question and research objectives. Finally the delimitations of this study are discussed.

1.1 INTRODUCTION

Although there is no universally accepted definition of e-Government (e-Gov) (Schedler and Scharf, 2001; Halchin, 2004; Yildiz, 2007), one view of e-Gov is the provision and enhancement of government services, internal processes and service delivery through the use of technology (Maumbe, Owei and Alexander, 2008). The categorisation of e-Gov efforts into the three broad categories of Government-to-Government (G2G), Government-to-Business (G2B) and Government-to-Citizen (G2C) is an approach that has been used to classify e-Gov initiatives (Brown and Brudney, 2001; Ndou, 2004; Presidential National Commission (PNC), 2012; Department of Communications (DoC), 2013a). Since this study focuses on G2G, there is also a need to understand what G2G means. G2G is a specific type of e-Gov concerned with the inter- and intra-government use of Information and Communications Technology (ICT) (Ndou, 2004; PNC, 2012). Examples of G2G include financial and human resource management systems used within government departments (Ebrahim and Irani, 2005; DoC, 2013a) and the National Automated Archival Information Retrieval System (NAAIRS), which is used by government for automated access to archived government records (Cloete, 2012; DoC, 2013a). Having established what e-Gov means, it is also important to understand why e-Gov is beneficial and hence worthy of being studied.

Promoting efficient service delivery to citizens, enhancing transparency in the provision of services and reducing the costs of service delivery are some of the benefits of e-Gov that have been suggested (World Bank, 2011a; Mukonza, 2014). Similarly Maumbe et al. (2008) describe

the benefits of e-Gov as simpler and quicker access to government information and services, a reduction in paperwork, quicker response times and increased participation in government. Research also indicates that e-Gov is a multi-dimensional and complex concept that is reinventing the public sector through the use of ICT tools. e-Gov transforms the way things are done and transforms relationships between branches of government, and between government and their customers and the business community (Ndou, 2004). e-Gov has therefore been adopted by various governments across the world (Mofleh, Wanous and Strachan, 2008; Rorissa, Demissie and Pardo, 2011; Cloete, 2012).

As in other countries across the world, governments in African countries are also adopting e-Gov. e-Gov presents opportunities to improve the lives of citizens in developing countries substantially (Department of Public Service and Administration (DPSA), 2003; Ciborra, 2005; Naidoo, 2007; Mofleh et al., 2008; Cloete, 2012; DoC, 2013a; Department of Telecommunications and Postal Services (DTPS), 2014a). e-Gov is also a means for reform and transformation in African countries. It can be used to transform and develop Second World economies into First World economies (Farelo and Morris, 2006) whilst also accelerating a country's economic growth (DTPS, 2014a). Thus e-Gov is beneficial to developed and developing countries.

Even though e-Gov brings with it many benefits, e-Gov projects are associated with failure rates as high as 85% in developing countries (Heeks, 2003). There is a gap in the literature on the failure rate of e-Gov in South Africa. There is also a gap in the literature on the failure rate of G2G. However, it has been established that the expected benefits of e-Gov have not been adequately realised in South Africa (ITFACTS, 2004; Naidoo and Palk, 2010). According to Farelo and Morris (2006), South Africa must still develop service and customer maturity in order to realise the benefits of e-Gov. e-Gov failure rates have necessitated a focus on understanding the nature of e-Gov and the factors that contribute to the success and failure of e-Gov projects (Schware and Deane, 2003; Ndou, 2004; Ebrahim and Irani, 2005; Gil-Garcia and Pardo, 2005; Dada, 2006; Kumar and Best, 2006; Naidoo, 2007; Matavire, Chigona, Roode, Sewchurran, Davids, Mukudu and Bouman-Abu, 2010). This study therefore aims to investigate the challenges facing e-Gov, focusing on G2G in the KwaZulu-Natal Department of Transport (KZN DoT).

Cases that illustrate the challenges facing G2G in South Africa have been identified (as summarised in Addendum 3) and these cases have informed the focus of this research. The G2G challenges identified in the cases in Addendum 3, and also supported by the literature, include user adoption (Braa and Hedberg, 2002; Ciborra, 2005; Ebrahim and Irani, 2005; Hossan, Habib and Kushchu, 2006), human resource skills (Heeks, 2003; Ndou, 2004; Ebrahim and Irani, 2005; Dada, 2006; Kumar and Best, 2006), G2G complexity (Ciborra, 2005; Daniels and LaMarsh, 2007; Matavire et al., 2010) and technology infrastructure challenges (Schware and Deane, 2003;

Ndou, 2004; Dada, 2006; Gulati, Yates and Williams, 2012). This study aims to investigate how these identified challenges affect G2G in the KZN DoT.

1.2 CONTEXT OF E-GOVERNMENT IN SOUTH AFRICA

1.2.1 The South African government landscape

South Africa is a constitutional democracy comprising three tiers of government: national, provincial and local (DPSA, 2003; Van Niekerk, 2013). National government is responsible for setting national norms and standards, and for formulating national policy. Provincial government structures perform certain exclusive functions at a provincial level (e.g. provincial planning, provincial roads and traffic) while also developing provincial policies, norms and standards in alignment with national policies. Local government structures also perform certain exclusive functions (e.g. firefighting services, refuse removal, electricity delivery, sewerage and sanitation, municipal roads services), and develop and implement policies in their local government municipal areas in line with provincial policies (DPSA, 2003).

This research is a case study on the KZN DoT, a provincial government department in KZN province. The KZN DoT's core functions include transport infrastructure services (concerned mainly with road construction and maintenance) and transport services (concerned mainly with road safety, the road traffic inspectorate, vehicle and license registration, and public and freight transport). The support functions of the KZN DoT include financial services, supply chain management, ministerial support, strategic planning services and corporate services. ICT support is provided from within the corporate services function in the department (KZN DoT, 2011). A detailed organogram of the KZN DoT is provided in Addendum 1.

The KZN DoT works with and takes direction from the National Department of Transport (KZN DoT, 2011). The KZN DoT also works with local government in KZN province in relation to roads and traffic management (KZN DoT, 2011). Other government bodies that affect the core functions of the KZN DoT include the Road Traffic Management Corporation (RTMC) and the South African National Roads Agency Limited (SANRAL). The RTMC is responsible for training traffic personnel, providing road traffic information, investigating and recording accidents, education and communication, and infrastructure safety audits. While the RTMC may be responsible for these functions, some of the functions are performed by the DoT on behalf of the RTMC (RTMC, 2014). SANRAL is tasked with maintaining the South African national roads network (SANRAL, 2014).

1.2.2 The e-Government landscape in South Africa

Various government departments and bodies play a role in ICT and e-Gov in South Africa. Table 1 presents an overview of these entities and describes the roles played in e-Gov.

Table 1. e-Government government stakeholders in South Africa

Government body	Role in e-Gov in South Africa	Reference
<p>Department of Public Service and Administration (DPSA)</p>	<p>Responsible for overall South African e-Gov policy making within which national and provincial government departments can set their own policies. Also responsible for ICT and information management norms, standards and regulations in South Africa.</p> <p>Prior to May 2014, the DPSA was responsible for the oversight of the State Information Technology Agency (SITA). Since May 2014 this oversight role has been performed by the newly formed Department of Telecommunications and Postal Services (DTPS).</p> <p>The mandate of the DPSA with regards to ICT and e-Gov is derived from the Public Service Act and Regulations (Proclamation 103 of 1994 as amended by Act 30 of 2007) (Green Gazette, 2013).</p>	<p>DPSA (2001); DPSA (2003); Abrahams (2009); GITOC (2011); Cloete (2012); ITWeb (2014)</p>
<p>Department of Telecommunications and Postal Services (DTPS)</p>	<p>A newly formed Ministry created in May 2014. The DTPS is presently responsible for the oversight of SITA, amongst other state-owned entities.</p> <p>The DTPS is responsible for ICT policy development and strategy, ICT infrastructure development, ICT information society development and research, and the implementation of the e-Skills Institute.</p> <p>The DTPS is responsible for the implementation of the South African national broadband policy, as well as for the implementation of the National Integrated ICT policy review.</p>	<p>DoC (2013b); ITWeb (2014); DTPS (2015b)</p>

Government body	Role in e-Gov in South Africa	Reference
Government Information Technology Officers Council (GITOC)	GITOC provides a consultative forum for the deliberation of ICT-related issues, and provides an advisory role to the Minister of Public Service and Administration. The Council comprises government ICT officers from the various government departments. A similar body exists in each provincial government, and is known as the Provincial Government Information Technology Officers Council (PGITOC).	DPSA (2003); Abrahams (2009); GITOC (2011); Cloete (2012)
State Information Technology Agency (SITA)	Shared ICT service provider to provincial and national government departments. SITA's role is to rationalise the procurement of ICT goods and services, to provide ICT-related services to government and to support the effective utilisation of ICT in government. SITA formerly reported to the Minister of Public Service and Administration, and since May 2014 reports to the Minister of Telecommunications and Postal Services. SITA's head office is in Pretoria, from which it provides services and support to national government departments. SITA also has a presence in each of the nine provinces in South Africa, providing services and support to the provincial and local government departments in each province.	DPSA (2003); GITOC (2011); Cloete (2012); ITWeb (2014); SITA (2014)
Office of the Government Chief Information Officer (CIO)	Policy development, regulatory and strategy formulation body within the DPSA, and specifically responsible for co-ordinating e-Gov activities and providing strategic leadership on e-Gov across the DPSA and government departments. The Government CIO serves as the Secretariat to GITOC.	DPSA (2003); Abrahams (2009); GITOC (2011); Cloete (2012)
Department of Communications (DoC)	Responsible for communications policy, research and development in South Africa. This includes responsibility for the country's broadcasting policy	Cloete (2012); DoC (2013a);

Government body	Role in e-Gov in South Africa	Reference
	<p>and the migration to digital broadcasting.</p> <p>The DoC is responsible for oversight of the Independent Communications Authority of South Africa (ICASA), which is responsible for regulating the communications, broadcasting and postal services sector in South Africa.</p> <p>The Presidential National Commission on Information Society and Development (PNC-ISAD) was created in 2002. PNC-ISAD is related to the DoC as the Secretariat of the PNC reports to the DoC. It is made up of national stakeholders and industry leaders in the ICT and development sectors.</p>	DoC (2015)
Department of Science and Technology	Responsible for research and innovation in the ICT sector, amongst others. The Council for Scientific and Industrial Research (CSIR) is an entity of the Department of Science and Technology, which includes a focus on the research, design and development of ICT systems and platforms.	Cloete (2012); CSIR (2013)

1.2.3 Contextual overview

The various stakeholders affecting e-Gov and the business of the KZN DoT are shown in Figure 1. It can be seen that there are four national departments, and a number of entities related to each of these national departments that play a role in e-Gov and the execution of the KZN DoT's core functions. Three of these national departments and entities have a provincial counterpart. Finally, the KZN DoT also works with local government to execute some of its core business functions.

Figure 1 presents an overall view of the landscape of e-Gov in the KZN DoT. Since this study focuses on a provincial government department, the mid-layer of the landscape (the provincial layer) is the primary focus. However, the provincial layer does not exist in a vacuum; hence, it is important to have a holistic view of the environment in which e-Gov and the KZN DoT operate.

e-Government stakeholders	NATIONAL		PROVINCIAL	LOCAL
	Department of Public Service and Administration			
	Entities	Office of the Government CIO		
		GITO Council	Provincial GITO Council	
	Department of Telecommunications and Postal Services			
	Entities	SITA	Provincial SITA	
		Sentech, USAASA, Telkom, Broadband Infracore, .zadna		
	Department of Communications			
Entities	PNC-ISAD			
	ICASA			
Department of Science and Technology				
Entities	CSIR (Meraka Institute)			
Stakeholders in the business of KZN DoT	Department of Transport		Provincial Department of Transport	Local Government - performs certain Transport related functions
	Entities	SANRAL		
		RTMC		

Figure 1. Summary of stakeholders affecting e-Government and the business of the KwaZulu-Natal Department of Transport

1.3 STATUS OF E-GOVERNMENT IN SOUTH AFRICA

e-Gov is part of the South African government's vision of making services more accessible to citizens. This is confirmed in the South African government e-Gov policy framework (DPSA, 2001; Cloete, 2012). In the Minister of Telecommunications and Postal Services' 2014/15 budget vote speech, ICT and e-Gov in particular were recognised as prerequisite and integral for efficient and effective government service delivery (DTPS, 2014a). e-Filing, e-Health and e-Education were some of the e-Gov initiatives identified for the attention of the DTPS in the 2014/15 financial year.

The vision for e-Gov in South Africa is also discussed by GITOC. GITOC recognises both back-office management (G2G) and front-office service delivery (G2B and G2C) as forms of e-Gov, which together form a holistic picture of the target state for e-Gov in South Africa (GITOC, 2011). This goal is depicted in Figure 2.

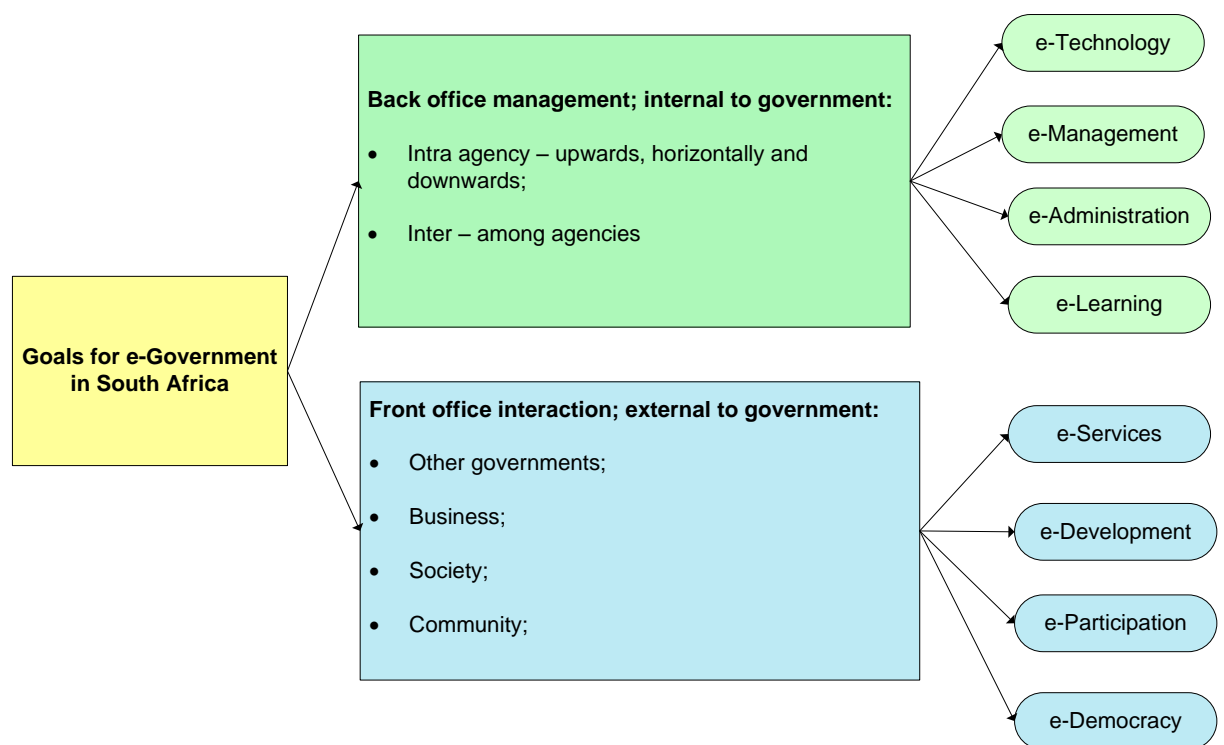


Figure 2. Goal of e-Government in South Africa (adapted from Government Information Technology Officers Council, 2011)

Based on examples of e-Gov in South Africa, it is reasonable to assume that some progress has been made in realising the vision of e-Gov in the country. In this regard, national and provincial government departments, and state-owned and public entities in South Africa, have undertaken various e-Gov initiatives (Moodley, 2005; Naidoo, 2007; PNC, 2012; Cloete, 2012; DoC, 2013a). Some of the e-Gov initiatives in South Africa include the Cape Gateway Project, the Cape Information Technology Initiative (CITI), the Mindset Network Organisation, the SchoolNet South Africa project and tele-centres in rural areas of South Africa (Matavire et al., 2010; Business Monitor International (BMI), 2012; PNC, 2012). Another e-Gov initiative is that of the South African Revenue Services (SARS) e-Filing solution (Naidoo, 2007; DoC, 2013a). e-Filing allows citizens and businesses to file tax returns annually and transact on their tax accounts at no cost, in a simple and secure online environment (Naidoo, 2007; SARS, 2012). SARS (2012) further indicates that the e-Filing system is comparable with countries like the United States, Australia and France. Other examples of e-Gov in South Africa include the implementation of the Integrated Financial Management System (IFMS), Personnel and Supply Chain Management Systems (DoC, 2013a); the Electronic National Traffic Information System (eNaTIS) electronic transport management system, which, amongst other functions, aims to consolidate traffic infringements in one central database (Naidoo, 2007; Cloete, 2012; DoC, 2013a); the e-HANIS (Home Affairs National Identification System) programme, which aims to streamline citizen personal identification data across government (Naidoo, 2007; Cloete, 2012; DoC, 2013a); and the National Automated Archival Information Retrieval System (NAAIRS), which facilitates access to archived records that are deemed to be public (Cloete, 2012; DoC, 2013a). The status of these e-Gov implementations in South Africa differs; some systems have been implemented and are in use while others are still in the development stage and have not yet been implemented. Thus there are several examples of e-Gov in South Africa.

However, examples alone do not provide adequate evidence of the status of e-Gov in South Africa. Thus different approaches have been used in the research to assess the status of e-Gov in South Africa. Table 2 summarises some of the approaches used and the findings from each of these approaches. Based on the different studies conducted, it would seem that South Africa has made progress in e-Gov implementation; however, concerns and challenges are also evident. There is a dearth of studies into specific challenges facing e-Gov in South Africa at the provincial government level.

Table 2. Different approaches used to assess South Africa’s e-Government progress

Reference	Approach used to assess South Africa’s e-Gov progress	Key findings
Trusler (2003)	e-Gov progress is assessed in relation to the implementation roadmap described in the South African e-Gov policy framework (DPSA, 2001).	South Africa is in the “information provision” phase of the implementation plan, with most government departments having an online presence and fairly wide access to government information online. According to targets set in the implementation roadmap, the expectation is that government departments should have already made progress in “two-way transactions” and “multi-purpose portals”. It would seem as if the 10-year implementation plan as defined in the e-Gov policy framework has been experiencing setbacks (Trusler, 2003).
Farelo and Morris (2006)	The status of e-Gov in South Africa is assessed according to 10 questions included in the “Roadmap for e-Gov” developed by the Pacific Council on International Policy.	In their analysis Farelo and Morris (2006) indicate that South Africa has made some positive progress. However, several concerns are raised, including lack of consensus on the e-Gov vision, human resource development needs, the need for an integrated monitoring and evaluation system, and the challenges inherent in working in an ever-changing landscape.
Abrahams (2009)	Various South African e-Gov policies and strategies are evaluated, in order to assess progress made in the implementation of e-Gov in the 10-year period spanning 1999 to 2009.	The South African e-Gov policy (DPSA, 2001) is critiqued and seen to be lacking in several areas. These include inadequate focus on how e-Gov will be used to improve service delivery to citizens; use of extensive IT jargon without contextualising the needs of citizens and other e-Gov stakeholders; a lack of innovation strategy

Reference	Approach used to assess South Africa's e-Gov progress	Key findings
		<p>and change management focus; and an inadequate definition of the research agenda for e-Gov.</p> <p>Overall, Abrahams indicates that e-Gov in South Africa is not meeting the deadlines and targets that have been set. Further issues identified in other South African strategic documents and policies are the lack of focus on developmental aspects that e-Gov can potentially provide related to education, health and social development. Confusion around accountability and the responsibilities of the various governmental departments and other stakeholders involved in e-Gov are highlighted.</p>
Naidoo and Palk (2010)	<p>An investigation of whether e-Gov investments in South Africa are paying off against the expected benefits.</p>	<p>It has been determined that formal benefits realisation is generally adopted as an approach. However, managing and realising benefits is less formal and sometimes not executed at all, with South African participants in the study having acknowledged benefits losses (Naidoo and Palk, 2010).</p>
Matavire et al. (2010)	<p>A qualitative study on the challenges of e-Gov in South Africa, focused on the Western Cape provincial government. Nine participants across government spheres were interviewed.</p>	<p>Leadership, project fragmentation, the perceived value of ICT, citizen inclusion and the co-ordination of tasks were identified as some of the key challenges inhibiting e-Gov success in the Western Cape provincial government. A number of relationships between the challenges were also suggested.</p>

Reference	Approach used to assess South Africa's e-Gov progress	Key findings
Rorissa, Demissie and Pardo (2011)	<p>The e-Gov progress of African countries is benchmarked using the West model, which is based on the number of websites sponsored by the government as the starting point (Cloete, 2012). The weaknesses identified in the West model are that the quality and functionality of the websites are ignored (Rorissa et al., 2011; Cloete, 2012). Rorissa et al. therefore developed a composite model by supplementing the West model, and assigning weights proportional to the level of e-Gov service development in the country.</p>	<p>Rorissa et al. (2011) provide five alternative benchmarking frameworks to the West model. According to the preferred alternative model (Framework 6, which incorporates the strengths of the other frameworks and overcomes their limitations), South Africa ranks third in Africa in the e-Gov benchmarking index. Egypt and Tunisia are ranked first and second respectively.</p>
Mutula (2012)	<p>Mutula assesses the e-Gov progress made in Sub-Saharan Africa, using the 2012 United Nations e-Government Development Index as a theoretical framework.</p> <p>The UN e-Government Development Index is compiled from the results of the UN e-Government Survey, which includes assessments of a country's telecommunications infrastructure (access to personal computer, telephones, Internet, mobile phones and fixed broadband), human capital (adult literacy rate and combined primary, secondary and tertiary enrolment), and e-participation</p>	<p>According to the 2012 UN e-Gov Survey, South Africa is ranked third in Africa, behind the Seychelles and Mauritius respectively.</p> <p>Although progress in South Africa is noted with regard to the implementation of e-Gov, challenges identified are the adult literacy rate, state of telecommunications infrastructure and commitment of government to genuine transformation that enables transparent and citizen-centred service delivery. The lack of adequate skills related to e-Gov is also emphasised.</p>

Reference	Approach used to assess South Africa's e-Gov progress	Key findings
	<p>(qualitative factors concerned with stakeholder information-sharing, consultation and involvement in decision making).</p> <p>The literature is then reviewed to identify some of the challenges facing e-Gov implementation in Sub-Saharan Africa.</p>	
DoC (2013)	<p>The National Integrated ICT Policy Green Paper (DoC, 2013a) asks how ICT can be used to advance the developmental agenda in the country. It examines elements of the policy and regulatory environment which have not been achieved or were partially achieved. e-Gov is one of several areas reviewed in the Green Paper.</p>	<p>The Green Paper presents some e-Gov successes such as e-Filing (online filing of tax returns) and also presents some statistical evidence in relation to e-Gov progress in South Africa:</p> <ul style="list-style-type: none"> • 355 multi-purpose community centres established to give rural communities access to government services • 800 public information terminals • The creation of an educational portal to assist teachers and learners in accessing educational material. <p>However, the Green Paper also highlights the challenges facing e-Gov in South Africa. Amongst the challenges, silo approaches in government and lack of co-ordination across the three spheres of government (national, provincial and local) are mentioned as the greatest obstacles to e-Gov.</p>

1.4 STATUS OF E-GOVERNMENT IN KWAZULU-NATAL

e-Gov initiatives have been endorsed by the KZN provincial government with the intention of transforming service delivery (KPMG, 2008). In particular, a KZN Provincial e-Gov Strategy has been developed by the Office of the Premier (KZN ICT, 2013; Singh and Thakur, 2013). Similarly, the KZN Department of Education has developed an e-Education strategy, while the KZN Department of Health has established an e-Health unit to foster the use of telemedicine in the province (KZN ICT, 2013).

Various e-Gov initiatives have been implemented or are currently in progress in the KZN provincial government. While not exhaustive, a summary of some of the initiatives is shown in Table 3.

Table 3. Some e-Government initiatives in the KwaZulu-Natal Provincial Government

Description of e-Gov initiative in KZN	e-Gov type	Reference
The KZN Provincial Nerve Centre is an information management system for monitoring and evaluating government service delivery in the province.	G2G	Prinsloo (2008); KZN ICT (2013)
An Electronic Fraud Management System has been implemented by the KZN Treasury. This system makes use of biometric access control to government financial and human resources systems in KZN. All government departments in KZN make use of this system.	G2G	ITWeb (2012)
Various initiatives in the KZN Department of Education have been identified as part of e-Education. These include: <ul style="list-style-type: none"> • An online e-Education portal that has been developed with the intention of making schools digital learning centres; and • Various e-Education applications that have been developed. 	G2C	KZN ICT (2013)

Description of e-Gov initiative in KZN	e-Gov type	Reference
An e-Gov portal launched in 2011 called KZN Online. It is perceived to be largely static.	G2C	Singh and Thakur (2013)
The KZN Department of Economic Development, Tourism and Environmental Affairs launched a website in 2012 to facilitate job creation. Limited traffic on the site has been noted.	G2C	Singh and Thakur (2013)
The eThekweni Municipality in KZN is implementing a Revenue Management System. The project started in 2003 and costs were projected at R250 million. However, more than 10 years later the system has not yet been implemented and current costs are more than R620 million. Stakeholders responsible for oversight of the municipality have indicated that they need to consider cutting their losses and abandoning the project.	G2G	Singh and Thakur (2013); The Mercury (2015)
A tender was awarded in 2014 for an electronic procurement tool to be implemented across government departments in KZN. A total budget of R21 million was allocated for the implementation over a three-year period from 2014 to 2017.	G2G	Du Plessis (2014)
The KZN Liquor Authority has been allocated a budget of R5 million over a period of three years, from 2014 to 2017, to regulate the liquor license industry.	G2G	Du Plessis (2014)

It can therefore be concluded that the KZN Provincial Government has made some progress in the implementation of e-Gov in the province. There exists a KZN Provincial e-Gov Strategy and examples of e-Gov initiatives implemented or in progress in the province. Despite several searches, however, there was no published academic literature identified on the state of e-Gov in the KZN Department of Transport specifically.

1.5 E-GOVERNMENT MATURITY MODELS

Various models have been developed to assess the state and maturity of e-Gov, with one study comparing at least 25 such models developed between 2000 and 2012 (Fath-Allah, Cheikhi, Al-Qutaish and Idri, 2014). There are a number of similarities that exist across models (Coursey and Norris, 2008; Fath-Allah et al., 2014), emphasising a linear and progressive development of e-Gov (Coursey and Norris, 2008) and four distinct phases of maturity emerging: online presence, interaction with citizens, online transactions and integration (Fath-Allah et al., 2014). The models do however have limitations; either in providing clarity on how e-Gov evolves from one stage to another and the borders between stages (Persson and Goldkuhl, 2005) or in providing empirical accuracy for the predictions made by the models in later stages of maturity (Coursey and Norris, 2008).

Although the Layne and Lee model (Layne and Lee, 2001) does have many similarities to other maturity models in earlier stages of maturity, it differs in the later maturity stages (Coursey and Norris, 2008). Instead of providing precise steps for e-Gov maturity, it emphasises intra and inter-government integration and sharing of data through technology in the later maturity stages (Persson and Goldkuhl, 2005; Coursey and Norris, 2008). The maturity stages within the Layne and Lee model (Layne and Lee, 2001) can be summarised as follows:

- **Catalogue:** Providing an online web presence, information and documents published by the government department are available online, and providing forms which can be downloaded and manually completed;
- **Transaction:** Services and forms are provided online, with connectivity to a working transactional database that supports the online services. This stage moves beyond static websites;
- **Vertical Integration:** System integration, data and information sharing is supported within similar functionalities and across different levels of government. For instance, local, provincial and national government departments involved in motor transport services can integrate with each other;
- **Horizontal Integration:** Sharing of data and information across different functionalities and supporting one-stop service provision for citizens. For instance, when a citizen applies for a child support grant the systems can be integrated across different departments such as South African Revenue Services (checking employment history), Home Affairs (checking ID numbers) and Social Development (processing application). To the citizen, the processing complexity and integration between government departments is transparent.

The Layne and Lee model is appropriate for describing the maturity of the KZN DoT because the model is generic enough to be applicable to G2G whereas many of the other maturity models lean heavily towards citizen-centred G2C forms of e-Gov. In addition the emphasis of the Layne and Lee model is on intra and inter-departmental integration which aligns with the objectives of G2G. Finally, the types of systems planned for implementation in the KZN DoT (see Addendum 7) can be clearly mapped to the maturity levels of the Layne and Lee model.

In terms of the Layne and Lee model, the KZN DoT is at the “Catalogue” level of maturity. An online web presence is established which provides information about the department as well as access to published documents. Forms can be downloaded and the information on the website is organised in terms of departmental functions as opposed to service access points. There are no services provided at the “Transaction” level, and any vertical or horizontal integration is manual without automated systems support and without automated data sharing in place.

1.6 PUBLIC MANAGEMENT AND GOVERNMENT-TO-GOVERNMENT

This section discusses public management and its applicability to e-Gov. Public management is introduced, followed by an examination of why it is considered to be relevant to G2G and this research.

1.6.1 Introducing public management

Public management encompasses the organisational structures, managerial practices and institutional values by means of which government officials enact the will of an executive authority (Ferlie, Lynn and Pollitt, 2005). Important components of public management are the achievement of objectives with maximum efficiency and the responsibility for results achieved (Hughes, 2003). Public management can also be seen as one aspect of public administration, which is the system of structures and processes that operate within a particular societal environment. These structures and processes aim to formulate and efficiently execute appropriate governmental policy (Fox, Schwella and Wissink, 2004; Thornhill, 2006). However, according to Hughes (2003), public policy, public management and public administration all essentially refer to the same thing — how the administrative components of a government are organised, process information and produce outputs in the form of policies, laws, or goods and services.

e-Gov is situated within the public sector, and hence public management provides the broader context within which e-Gov exists. G2G is a particular kind of e-Gov (along with G2B and G2C) and e-Gov in turn is a particular kind of information system. A Venn diagram can be used to

illustrate the contextualisation of G2G within e-Gov, within information systems and broadly within the domain of public management (Figure 3).

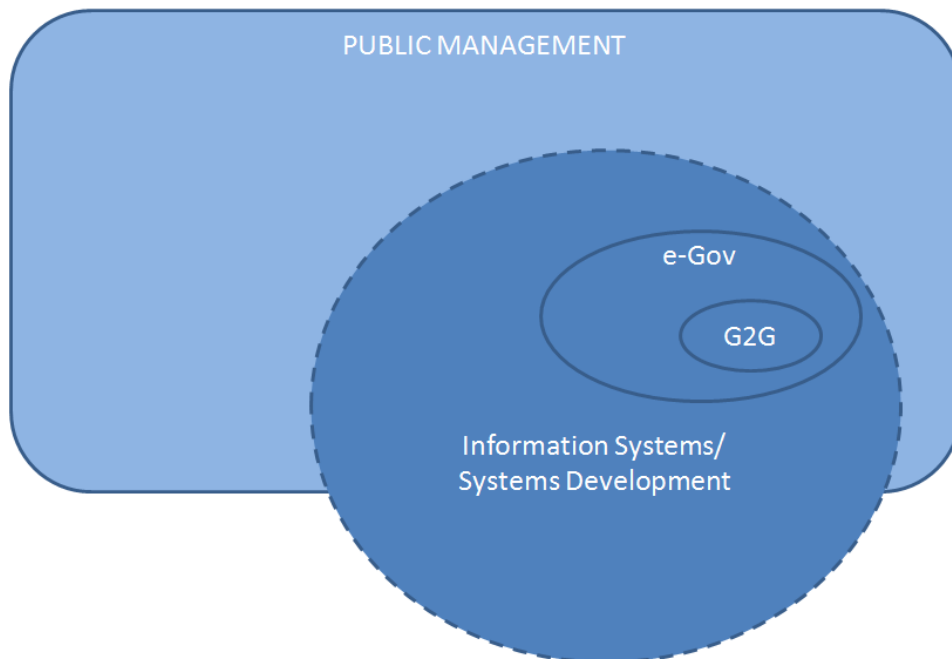


Figure 3. Contextualising G2G within public management

1.6.2 Why public management is relevant to Government-to-Government

e-Gov is concerned with the use of technology to provide and enhance government services, internal processes and service delivery (Maumbe et al., 2008). According to Mukonza (2014), e-Gov has become entrenched in government and it is impossible to conceive of government operating without it. Thus e-Gov itself is a government policy (OECD, 1998; DPSA, 2001; Dunleavy, Margetts, Bastow and Tinkler, 2005; Tsankova, 2011) and as such has to be managed effectively by public managers to achieve its intended objectives, just as any other government policy would need to be managed (Dunleavy et al., 2005; Mukonza, 2014).

e-Gov itself has potential impacts on the development of policy, including encouraging collaborative and interactive policy making (Bernadi, 2009; Lapsley, 2009; Tsankova, 2011) and increasing the effectiveness of the implementation of any other government policies (Fountain, 2001; Ferlie et al., 2005). It provides new ways to plan, co-ordinate, formulate and implement decisions in the public sector (Mukonza, 2014). There is recognition that e-Gov can be applied to implement government reform, by enhancing government efficiency, and changing and potentially redefining how government delivers services (OECD, 1998; Hughes, 2003). Although ICT cannot determine the appropriate performance measures for the implementation of government policy, it

can be applied to make the data collection related to policy implementation easier, as the collation of the data and the generation of reports related to policies can be automated (Fountain, 2001). Similarly, Schedler and Scharf (2001) indicate that it is unthinkable to modernise the state without e-Gov, both in theory and in practice. There are even bold propositions that e-Gov is the future of public administration, and that e-Gov should be recognised as a new paradigm in public management (Mukonza, 2014).

The relevance of public management for e-Gov, and G2G in particular, thus becomes apparent at the outset. G2G is impacted by public management, whilst simultaneously public management is impacted by G2G (Fountain, 2001; Homburg, 2004). Although these impacts and potential benefits are acknowledged, there is a significant divorce between the fields of public management and e-Gov, with an almost complete absence of e-Gov from central public management theory texts and literature (Dunleavy et al., 2005). Fountain (2001) indicates that the gap is growing; the importance of ICT and its impact on government is increasing whilst the attention of researchers to this phenomenon is lagging behind. Similarly, Mukonza (2014) indicates that scholars in the field of public management cannot afford to ignore the development of ICT and e-Gov in particular. Dunleavy et al. (2005) go further to state that this neglect has been “unhealthy”, and that governments have not fully capitalised on the potential value of e-Gov on practical government policy making.

Having identified the bi-directional relationship between e-Gov and public management, it is argued that public management theory is both applicable and useful in understanding the challenges that e-Gov faces. The problem statement, research question and objectives of this study are established in the sections that follow in this chapter. Chapter 2 details how public management has been applied in this study.

1.7 PROBLEM STATEMENT

There are a number of motivating factors for implementing e-Gov. One such factor is the potential of e-Gov to transform government’s relationships with citizens and businesses through the use of ICT (Cloete, 2012). In addition, e-Gov can promote citizen empowerment, improved service delivery and accountability, increased transparency and improved government efficiency (Maumbe et al., 2008; World Bank, 2011a; DoC, 2013a). The South African government also recognises these motivating factors for implementing e-Gov and the fact that e-Gov can play a role in transforming service delivery to citizens (DPSA, 2001; DPSA, 2008; DoC, 2013a). Accordingly, R1.7 billion was allocated by the South African government to be spent on ICT over the three fiscal years up to 2012 (BMI, 2012). Considering the different motivations for implementing e-Gov, and the financial resources that are allocated to ICT in South Africa, it is

reasonable to assume that there is a need for e-Gov initiatives to succeed and deliver the expected benefits.

However, the majority of e-Gov initiatives fail (Heeks, 2003). In the developing world, research has shown that e-Gov failure rates are as high as 85% (Heeks, 2003). It would therefore appear that the implementation of e-Gov applications faces certain challenges.

As a specific category of e-Gov, G2G also faces specific challenges. Challenges encountered in the implementation of G2G applications include user adoption (Ndou, 2004; Ciborra, 2005; Ebrahim and Irani, 2005; Hossan et al., 2006), the complexity of G2G (Heeks, 2003; Ciborra, 2005; Daniels and LaMarsh, 2007; Matavire et al., 2010), the lack of appropriate and adequate human resource skills (DPSA, 2001; Heeks, 2003; Ndou, 2004; Ebrahim and Irani, 2005; Dada, 2006; Kumar and Best, 2006) and inadequate technological infrastructure to support G2G adequately (Heeks, 2003; Schwere and Deane, 2003; Ciborra, 2005; Maumbe et al., 2008). These challenges are evident in examples of G2G implementations in South Africa.

The following are some examples of G2G challenges in South Africa:

- The G2G Integrated Financial Management System (IFMS) project, where the complexity of the application, the lack of appropriate skills and issues related to user adoption were identified as challenges (Parliamentary Monitoring Group (PMG), 2012)
- The Department of Transport G2G Electronic National Traffic Information System (eNaTIS) project, where technology infrastructure, issues related to user adoption and complexity were identified as challenges (Naidoo, 2007; Auditor General of South Africa (AGSA), 2008; Cloete, 2012)
- The Department of Home Affairs National Identification System (HANIS) project, where the complexity of requirements and skills shortages were identified as challenges (PMG, 2003)
- The G2G Health Information Systems, where issues of user adoption, system abandonment and lack of effective guidance in implementing e-Health policies were identified as challenges (Braa and Hedberg, 2002; DoC, 2013a).

Further examples of G2G challenges in South Africa are described in Addendum 3.

The literature shows clearly that the implementation of G2G applications faces certain challenges, and specific examples of such G2G challenges in South Africa have been identified. It is therefore reasonable to assume that there are challenges faced in the KZN DoT with regard to G2G implementations. However, there is a gap in the literature on what these challenges are and how they affect G2G. The research problem statement can therefore be summarised as follows:

- *G2G faces challenges that prevent its full benefits from being realised.*

The problem statement is represented diagrammatically in Figure 4. The increasing pressures and motivators for governments to implement G2G are presented alongside the challenges of G2G and the resulting outcomes.

1.8 THE RESEARCH QUESTION

The research question focuses on obtaining a better understanding of the challenges facing G2G. The cases discussed in Addendum 3 indicate four broad categories of challenges in South Africa: user adoption, human resource skills, complexity of G2G and technology infrastructure. These four broad categories were also identified in the literature review and thus informed the research question. In addition, the research site is the KZN DoT and the research question is therefore:

- How do the identified G2G challenges affect G2G in the KZN DoT?

Based on the literature review, and supported by the examples of G2G challenges faced in South Africa (see Addendum 3), the research question can be broken down into the following sub-questions:

- How does user adoption affect G2G?
- How do human resource skills affect G2G?
- How does the complexity of G2G affect G2G?
- How does technology infrastructure affect G2G?
- What are the other challenges affecting G2G?

1.9 OBJECTIVES OF THE STUDY

The primary objective of this research is to aid in *explaining* the phenomenon of G2G in South African provincial government. This explanation is intended to promote a greater understanding of, or insights into, the phenomenon of interest (Gregor, 2006). Thus the status of G2G is examined in the KZN DoT with the objective of better understanding the challenges facing G2G. With a better understanding of G2G challenges, preventive and mitigating measures can be implemented to minimise the likelihood of G2G failure in the KZN DoT.



Figure 4. Motivators, challenges and outcomes of Government-to-Government initiatives

The specific research objectives are therefore:

- To determine whether G2G faces challenges in the KZN DoT; and
- To establish a better understand of the challenges facing G2G, should such challenges exist.

A qualitative study has been undertaken in the KZN DoT using a case-study research design. Semi-structured interviews and document analysis were used as the data-generation method. Thematic analyses and qualitative coding were used to analyse the data and draw conclusions.

1.10 JUSTIFICATION FOR THE STUDY

The justification for this study is first presented from a theoretical point of view and then from a practical perspective.

1.10.1 Justification from a theoretical perspective

e-Gov studies focus primarily on the outputs of e-Gov (e.g. websites and online government services) and the outcomes of e-Gov (how an e-Gov system affects a variable such as corruption or government effectiveness), with little focus on the *processes* of e-Gov (decision making, planning and implementation) (Yildiz, 2007). This study contributes to focused research on these e-Gov *processes* by specifically looking at the challenges of e-Gov.

In addition, there is a dearth of research into the challenges facing G2G in an African and South African context. Such studies are predominantly conducted from the perspective of the developed world (Heeks and Bailur, 2007; Mutula, 2012). Mutula (2012) goes further to state that e-Gov lacks a sound theoretical framework that can be used to address key issues relating to e-Gov implementation. Thus this study also attempts to contribute towards filling this gap in research by examining the challenges facing G2G in the *South African provincial government* context.

The literature review has shown that there is an almost complete absence of e-Gov from central public management theory texts and literature, and that this neglect has been “unhealthy” and has not fully capitalised on the potential value of e-Gov for practical government policy making (Dunleavy et al., 2005). This research makes a contribution by understanding how e-Gov affects *public management*. In addition, *public management theory* is used to understand the e-Gov challenges.

From a methodological perspective, this study contributes to the lack of qualitative research on e-Gov (Heeks and Bailur, 2007; Irani, Weerakkody, Kamal, Hindi, Osman, Anouze and El-Haddadeh, 2012; Mutula, 2012).

1.10.2 Justification from a practical perspective

The study attempts to contribute towards the improved management and realisation of benefits from G2G initiatives. The researcher is a practitioner in the field of e-Gov and has first-hand experience of some of the challenges faced in provincial government. In addition, other forms of e-Gov such as G2C and G2B are dependent on G2G in order to provide enhanced e-Gov value to citizens and businesses (Hughes, 2003).

e-Gov and G2G success is particularly important at present, as a number of departments in the South African national and provincial government (including the KZN Provincial Government and the KZN DoT) plan on implementing e-Gov and G2G applications. It is therefore important to understand and address G2G challenges in order to improve the chances of a successful implementation of G2G. Accordingly, such a study can be useful in developing more robust and effective plans in anticipation of what often goes wrong in e-Gov projects (Dada, 2006).

1.11 DELIMITATIONS OF THE STUDY

The delimitations of the study are that:

- In South Africa the three levels of government that exist are national, provincial and local (Van Niekerk, 2013). This study focuses only on the provincial level of government. This is due to a limited number of academic studies on e-Gov challenges at provincial government level in South Africa;
- Of the nine provinces in South Africa (Van Niekerk, 2013), this study focuses only on KZN province and the KZN DoT in particular. This is the research site for the study and has been chosen because of the accessibility to research participants and accessibility to information;
- Since the study aims to understand the challenges facing G2G specifically, only back-office G2G applications will be part of the study. Thus G2C and G2B applications are not considered in this study; and
- The study focuses primarily on four G2G challenges that have been identified in the literature, and on where there is evidence for the existence of such challenges in the South African government. These challenges are user adoption, complexity, technology infrastructure and human resource skills.

1.12 SUMMARY

The South African government has adopted e-Gov as a means to improve service delivery to citizens. However, e-Gov faces a number of challenges and suffers from high failure rates, especially in developing countries.

G2G is a form of e-Gov that also faces challenges. These challenges include user adoption, complexity, technology infrastructure and human resource skills, amongst others, and have been confirmed in the literature and by various examples from the South African government. Since the South African government is implementing a number of G2G systems at present, and plans on introducing additional G2G systems in the future, there is a need to better understand the challenges facing G2G in order to reduce the risk of failure.

e-Gov exists within the public sector and thus the discipline of public management provides an appropriate theoretical basis for analysing and understanding the challenges facing G2G.

This research aims to improve the understanding of G2G challenges in the South African provincial government using the KZN DoT as a case study.

Chapter 2 presents a review of the literature related to G2G challenges. Drawing on theories from e-Gov and public management, a conceptual framework for this research is established. The research methodology is discussed in Chapter 3, whilst Chapter 4 describes the data analysis techniques used in this research. The data is analysed in Chapter 5, and Chapter 6 draws interpretations from the data analysis. Finally, conclusions are discussed in Chapter 7, together with the limitations of and recommendations from this research.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

This chapter contains a review of the literature and applicable theory related to the challenges facing G2G. Key terminology related to the research topic is defined. A review of academic literature is conducted pertaining to the specific G2G challenges of User Adoption, Complexity, Human Resource Skills and Technology Infrastructure. Examples and evidence of these challenges in a South African G2G context are also incorporated into the literature review. This is followed by a discussion of applicable theory. Firstly an e-Gov theoretical model called the Factor Model, which is useful in understanding G2G challenges, is discussed; thereafter public management theory is discussed. Drawing on both e-Gov and public management theory, a conceptual framework for this research is developed.

The chapter concludes with an overview of key lessons from the literature review, and by identifying gaps in the literature.

2.1 LITERATURE REVIEW APPROACH

The approach to identifying and reviewing the literature relevant to G2G is based on the following considerations:

- G2G is a particular type of e-Gov and hence literature specific to G2G has relevance;
- As G2G is a type of e-Gov, literature on e-Gov in general is relevant to this research (literature related specifically to G2B and G2C is excluded as this does not incorporate G2G);
- G2G exists within a public-sector context. Therefore literature and theory on public management, especially where there is an emphasis on the role and utilisation of ICT, has relevance to this research.

This chapter reviews the literature related to e-Gov in general, identifying and incorporating as far as possible G2G-specific literature. A model of e-Gov challenges is also discussed in this chapter, followed by a discussion on public management theory relevant to e-Gov.

2.2 KEY DEFINITIONS

2.2.1 e-Government

Maumbe et al. (2008) provide a comparative view of some of the definitions of e-Gov. The comparison highlights the different foci of e-Gov definitions, which are focused either on transformation, service delivery, the use of Internet and ICT, or public-sector efficiency. For the purposes of this study, the definition as proposed by Farelo and Morris (2006) is adopted by the researcher as it incorporates these different foci of e-Gov (as highlighted by Maumbe et al. (2008)) into one concise definition:

The use of Information and Communication Technology (ICT) to foster more efficient and effective government, improve public access to information, enhance accessibility to government services, and make government more accountable to citizens (Farelo and Morris, 2006).

2.2.2 Government-to-Government

e-Gov efforts can be categorised based on the participants engaging in the e-Gov interaction or transaction. An approach to understanding e-Gov is to classify it into three broad categories: Government-to-Government (G2G), Government-to-Business (G2B) and Government-to-Citizen (G2C) (Brown and Brudney, 2001; Ndou, 2004; PNC, 2012). G2C is concerned with making government services accessible to citizens using technology (e.g. online applications for the renewal of driver's licenses), while G2B is concerned with making government services accessible to business (e.g. online registration on a suppliers database) using technology. Since this study focuses specifically on G2G, there is a need to provide a more detailed definition of it.

G2G is a form of e-Gov concerned with inter- and intra-government transactions (Ndou, 2004; Parrish, 2006; PNC, 2012). G2G also includes systems that support the back-office functions of government, where the back-office functions support the delivery of front-line or core government services (United Nations, 2008). Thus G2G refers to the information sharing, streamlining and automating of government services and processes within a government department (intra) or between government departments (inter). Inter-government transactions encompass both horizontal and vertical transactions, i.e. across different departments (e.g. the Department of Home Affairs, Department of Social Development and Department of Human Settlements), across spheres of government (e.g. national, provincial and local), or across the same type of department

at different levels of government (e.g. the National Department of Health and Provincial Department of Health in each of the nine provinces).

GITOC (2011) distinguishes between back-office management (G2G) and front-office interaction (G2B and G2C) as a means of differentiating between the different forms of e-Gov (see Figure 2). A related model is the “Framework of e-Gov Architecture” (Ebrahim and Irani, 2005), which is useful in contextualising G2G and discerning between G2G and other forms of e-Gov, as applied in this study. An adapted model of the “Framework of e-Gov Architecture” is provided in Figure 5.

Figure 5 highlights that e-Gov architecture comprises an *access* layer within which different users of e-Gov access e-Gov services, using a variety of channels. The e-Gov *portal* layer is concerned with providing e-Gov services to citizens and business whilst also integrating different services into one single portal. The e-Gov portal layer is particularly applicable to G2B and G2C systems. G2G exists within the *e-Business* layer, which is focused on providing ICT support within and across government departments. The e-Gov architecture also highlights the relationship between G2G, G2B and G2C systems. Lastly, the *infrastructure* layer comprises technology and network infrastructure that is required to support the e-Gov systems. Thus the G2G systems that are the focus of this study are best described by the *e-Business* layer.

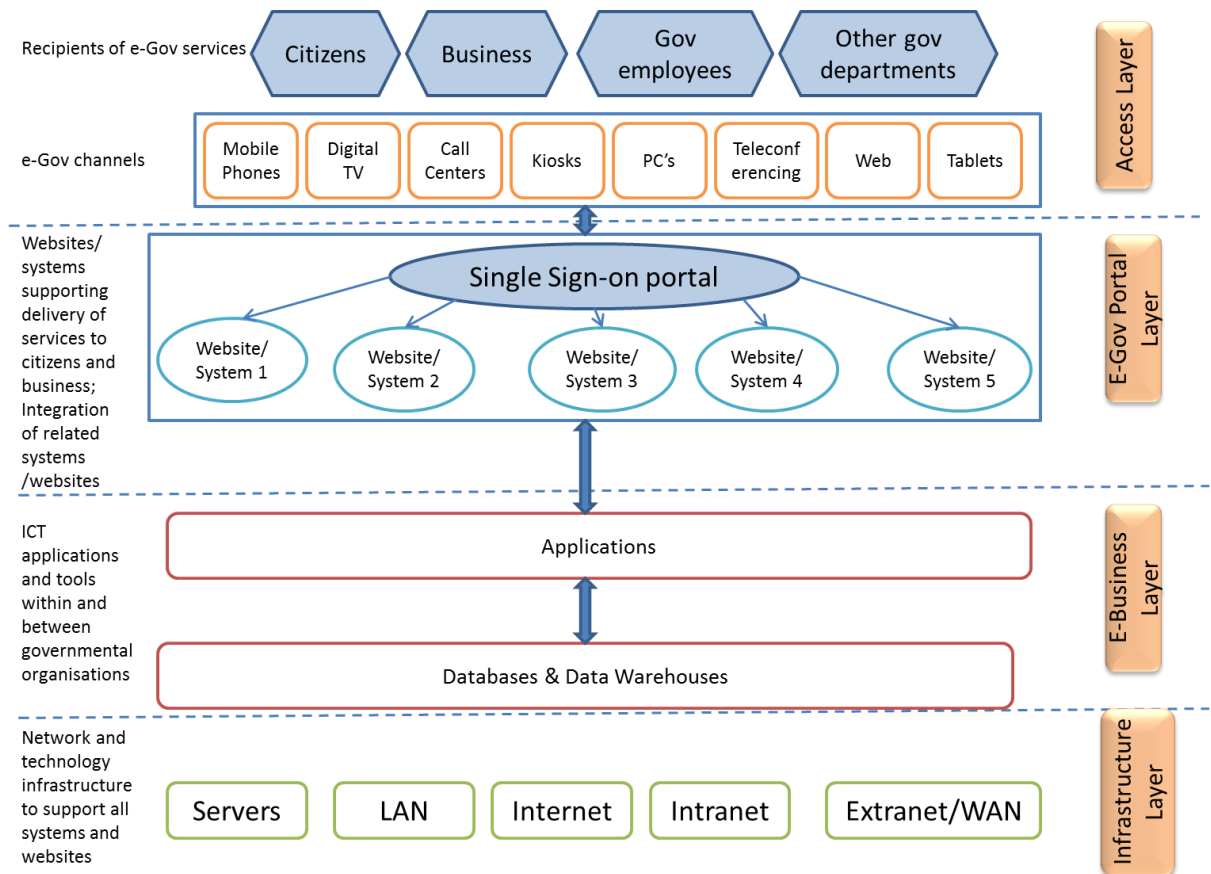


Figure 5. e-Government architecture framework (adapted from Ebrahim and Irani, 2005)

2.2.3 Government-to-Government challenges

This study seeks to investigate G2G challenges. It is therefore necessary to define what is meant by a “challenge”. In this study a “challenge” increases the likelihood of failure of G2G, or, viewed differently, reduces the likelihood of success of G2G. Thus there is also a need to define what is meant by e-Gov “failure” and “success”.

Heeks (2002) indicates that success and failure in e-Gov initiatives can be categorised into three classes: total failure, partial failure and success. This categorisation is useful and covers the spectrum of possible outcomes of e-Gov initiatives. Thus Heeks’s (2002) definition of e-Gov success and failure is adopted for the purposes of this study:

- Total failure: Refers to an e-Gov initiative which was never implemented or in which a new system was implemented but immediately abandoned.
- Partial failure: In this case major goals are unattained or there are significant undesirable outcomes of the e-Gov initiative.

- Success: Most stakeholder groups attain their major goals and do not experience significant undesirable outcomes.

Thus a “challenge” in this study increases the likelihood of a total failure or a partial failure of G2G. Viewed differently, a “challenge” reduces the likelihood of success of G2G.

2.2.4 Public management

Public management is concerned with the achievement of government objectives with maximum efficiency and being held responsible for the results achieved (Hughes, 2003). In this study, public management is the system of structures and processes that aim to formulate and efficiently execute appropriate governmental policy (Fox, Schwella and Wissink, 2004; Thornhill, 2006). e-Gov and G2G are seen as tools that can be used to formulate and execute government policy. In addition, public management structures and processes are considerations for the implementation and success of Gov and G2G. Thus e-Gov and G2G affect public management, whilst public management simultaneously affects e-Gov and G2G.

2.3 LITERATURE REVIEW: CHALLENGES FACING GOVERNMENT-TO-GOVERNMENT

The researcher identified cases from articles and websites that identify and discuss the challenges encountered by G2G in South Africa. These cases are summarised in Addendum 3 and informed the focus of the literature review and the research questions. The four broad category of challenges identified in the cases include User Adoption, Human Resource Skills, Complexity of G2G and Technology Infrastructure.

Having identified the four broad categories of challenges from the cases, the literature review as presented in this section attempted to understand the G2G challenges better. User Adoption is discussed first, followed by Human Resource Skills, Complexity of G2G and finally Technology Infrastructure.

2.3.1 User Adoption challenges in Government-to-Government

The success of a G2G project depends on the appropriate use of the system by the intended user base. Failure to adopt the system may mean that the expected benefits cannot be realised (Koh et al., 2010). Lack of user adoption can be caused by different reasons. Lack of user involvement (Braa and Hedberg, 2002; Ciborra, 2005), inadequate business changes to support the G2G system implementation (Ebrahim and Irani, 2005), inadequate change management (Ndou, 2004; Ciborra,

2005, Hossan et al., 2006), organisational culture barriers (Ndou, 2004; Ebrahim and Irani, 2005) and inadequately addressing users' needs (Kayed, Nizar and Alfayoumi, 2010; Matavire et al., 2010) are some of the types of challenges related to user adoption.

Lack of user involvement is one reason that may cause lack of adoption. Ciborra (2005) mentions the Jordanian government sales tax e-Gov project, which faced user resistance. This was due to lack of user involvement and participation. Similarly Braa and Hedberg (2002) mention Health Information Systems in South African provincial government departments, which were abandoned by users or eventually replaced by other systems. Involvement of users in system design can, however, on the one hand serve as a mechanism of coercive control and deskilling of the workforce; on the other hand, user involvement can be used as a tool to leverage expertise, foster joint problem solving and complement human capacity (Fountain, 2001). Thus, inadequate user involvement in G2G projects may result in user resistance or system abandonment. At the same time, user involvement may also lead to G2G designs that deskill users or embed control of users within systems.

Implementation of a G2G system alone does not guarantee user adoption and realisation of benefits. Changes to business processes and operations may also be required. Ebrahim and Irani (2005) indicate that public-sector organisations must re-engineer business processes in order to adapt to new strategies and e-Gov culture. Ciborra (2005) goes further to state that e-Gov services demand the transformation of some parts of government. Thus system changes must be supported by appropriate business changes in order to promote user adoption.

Change management during the course of an e-Gov project also affects user adoption. Change management includes user awareness, involvement and consultation to build support and minimise resistance (Ndou, 2004; Ciborra, 2005, Hossan et al., 2006). Strong change management in e-Gov also requires leadership with a project champion. Incentives to create ownership and commitment are also required (Hossan et al., 2006). Readiness and change management have also been identified as challenges in the implementation of the Integrated Financial Management System (IFMS) in South Africa (PMG, 2012), in the Personnel Salary System (PERSAL) (The Presidency, 2010) and in the Durban Community Information Link (DCIL) (Heeks, 2008). It would therefore seem as if change management requires different forms of interventions to improve the chances of user adoption.

The primary impacts of e-Gov are achieved through changes in organisational culture within a government department, as well as behavioural changes in civil society (Dunleavy et al., 2005). At the same time, however, organisational culture may prove to be a barrier to the user adoption of e-Gov (Ndou, 2004; Ebrahim and Irani, 2005). In this case, lack of adoption by users may be

premeditated. The introduction of an automated solution may make certain issues apparent, such as the identification of bottlenecks or the lack of adherence to procedures. This is highlighted in the case of Vijayawada Online Information Center (VOICE) in India. Users who feared job loss, a reluctance to learn new technologies and work practices, as well as loss of income received from bribes led to user resistance (Ndou, 2004). Another example of organisational culture affecting user adoption is the “angry orphans” phenomenon. ICT specialists who are involved in the current applications in government are threatened by the introduction of new e-Gov applications; hence, they respond by creating obstacles and making e-Gov project work difficult to complete (Ciborra, 2005). There is therefore a need to identify, understand and address potential organisational cultural barriers.

Users’ needs must be addressed in order to achieve user adoption. These needs are defined in the user requirements specifications; therefore, requirements specification is the most important part of the software development life cycle, particularly in large-scale systems such as e-Gov applications (Kayed et al., 2010). However, requirements specification is also difficult, especially in the case of G2G systems (Parrish, 2006). Paetsch et al. (2003) indicate that chains of knowledge in requirements specification lead to misunderstandings; therefore, talking to the user directly to obtain information on requirements reduces the likelihood of misunderstandings (Wing, 1990; Paetsch et al., 2003). However, hierarchical governmental structures make it difficult to talk directly to the user and understand user needs (Matavire et al., 2010). Therefore, the difficulty in eliciting and accurately documenting user requirements contributes towards lack of user adoption.

User Adoption is an important component to the success of G2G. However, it would appear as if User Adoption presents different types of challenges to G2G.

2.3.2 Government-to-Government Human Resource Skills challenges

G2G projects require different types of human resource skills. Skills are required in the methodologies and technologies used for the G2G implementation, as well as appropriate business skills to support and entrench the use of an application in government (Ndou, 2004). Further skills are required in relation to information management, knowledge management and change management (Abrahams, 2009). These skills are critical for e-Gov success (Ndou, 2004; Abrahams, 2009). The importance of human resource skills is reiterated in the South African e-Gov policy framework (DPSA, 2001) and the Minister of Telecommunications and Postal Services’ 2014/15 budget vote speech (DTPS, 2014a), recognising ICT skills as fundamental to realising the e-Gov vision. However, human resource skills present different types of challenges to G2G.

One of the types of G2G skills challenges is related to the appropriate skill set and adequate quantities of skills, i.e. the number of resources. According to DTSP (2014a), South Africa requires skills to roll out the infrastructure required for e-Gov, as well as skills for the development of relevant e-Gov content. Whilst skills development may take place in South Africa, concerns have been raised as to whether the skills being developed are appropriate and adequate. In this regard the DPSA (2001) claims that ICT skills have been developed in a haphazard fashion. This may not necessarily be of benefit to government service delivery initiatives (DPSA, 2001). Similarly, Ndou (2004) indicates that a “chronic lack of qualified staff and inadequate human resource training” is a particular problem facing e-Gov in developing countries. Heeks (2003) also describes staffing and skills as one of the design-reality gaps that contribute towards e-Gov failure. This gap refers to the number and types of skills required to implement an e-Gov project successfully, as compared to the current state. Skills challenges related to the appropriate skill set and adequate quantities of skills are highlighted in South African G2G projects such as the IFMS (PMG, 2012), PERSAL (The Presidency, 2010) and the Home Affairs National Identification System (HANIS) (PMG, 2003). Similarly the DCIL highlights lack of capacity as a challenge contributing to the project’s failure (Heeks, 2008). Therefore the lack of appropriate skills coupled with the quantity of skills required is still a type of skills challenge facing G2G.

Staff retention is another type of challenge related to human resource skills. Public sector organisations usually have a higher rate of staff turnover. It is felt that working conditions and remuneration are not comparable with the private sector (Ebrahim and Irani, 2005). In addition, the dependence on foreign ICT skills and the lack of development of South African government ICT skills are highlighted as issues in the e-Gov policy framework (DPSA, 2001). Thus, retaining skills appears to be a challenge for G2G in South Africa.

Training is also a type of challenge related to human resource skills. In particular, the training of citizens and government officials when an e-Gov system is implemented is highlighted as a contributor to the failure rate of e-Gov projects (Dada, 2006). Without being adequately trained, users of the system will not be in a position to make optimal use of the functionality of a G2G system. This is illustrated in different examples of G2G projects where training has presented challenges. These examples include the case of eNaTIS (AGSA, 2008) and the case of PERSAL (The Presidency, 2010), where the need for appropriate training and skills development is highlighted. Ndou (2004) also highlights the case of Beijing’s Business e-Park initiative, in which the education programme was a key part of the project implementation. The training involved government officers and leaders, general government staff and public users. Conversely, Kumar and Best (2006) indicate that a lack of training and the relocation of knowledgeable staff contributed to the failure of the Sustainable Access in Rural India (SARI) e-Gov project in Tamil

Nadu. The South African government has, however, started to make some progress in addressing the ICT skills challenges by establishing partnerships with academic institutions and the private sector. The National e-Skills Training Programme has been established with R51.4 million being set aside to fund the programme (DTPS, 2014a). Despite these steps to address the e-Gov skills challenges, training is an important component that may contribute to human resource skills challenges affecting G2G. Abrahams (2009) indicates that there is a need to enhance the human resource capacity to design and operate individual e-Gov projects in the short term, whilst in the long term the human resource capacity is capable of building and sustaining comprehensive e-Gov.

Human resource skills thus presents various types of challenges to G2G, which include the appropriateness of skills-sets, the adequacy of skills quantities (i.e. number of resources), staff retention and training of staff.

2.3.3 Complexity of Government-to-Government

Software engineering projects are inherently complex in nature. Daniels and LaMarsh (2007) argue that it is this inherent complexity that contributes towards the high failure rate of ICT projects. As far back as 1987, Brooks (1987) indicated that complexity, together with the conformability, changeability and invisibility of software, increases the likelihood of project failure. (Software is intangible (invisibility), software is likely to change over time (changeability) and software must often conform to the environment in which it will be used (conformability).) This type of complexity is especially applicable in a government context as the software is often flexible and open to myriad designs and uses (Fountain, 2001). Thus, as a type of software engineering project, G2G projects will also face this inherent complexity. In addition, G2G projects also face other types of complexity challenges.

The analysis phase of G2G projects may present complexity challenges. This is highlighted by Ciborra (2005) using a case study of the Jordanian government e-Gov project. A “straightforward” process turned out to involve 130 services that needed to be documented. In addition, there were about 35 dependencies between these services that involved transactions across different government departments. Also added to this was the lack of availability and lack of reliability of information on the current state of affairs of the government operations and processes, which made the analysis more difficult (Ciborra, 2005). Similarly, in a South African context, the lack of documented business processes has been identified as a challenge to e-enablement of government services (Abrahams, 2009). Other examples of complexity in G2G analysis are evident in two cases from the United States: firstly, the G2G system used by the Federal Aviation Agency automating the rules for decision making when de-icing aircraft before take-off; and secondly, the

system used by the National Weather Service to monitor and detect severe weather patterns and issue early warnings (Fountain, 2001). There are also examples of such complexity in G2G in South Africa. These include the case of the IFMS, where departments underestimated the time required for, and the complexity that affected, the procurement and contract negotiation processes (PMG, 2012), and HANIS, where the complexity of the project scope is highlighted (PMG, 2003). Thus the analysis phase of G2G projects presents complexity challenges.

Another aspect involving complexity related to G2G is the need for compliance with legislative requirements. In South Africa, before addressing the user requirements of a G2G system, the hierarchy of legislative requirements must be complied with. Examples of this hierarchy are illustrated below:

- Any South African government department has to ensure compliance with the legislation applicable to all government departments. An example is the Public Finance Management Act (PFMA) (Act No.1 of 1999 as amended by Act 29 of 1999) (Green Gazette, 2011) and Public Service Act and Regulations (Proclamation 103 of 1994 as amended by Act 30 of 2007) (Green Gazette, 2013).
- In addition, government departments will need to ensure compliance with legislation that may apply particularly to that department. An example is the Government Immovable Asset Management Act (GIAMA) (Act 19 of 2007) in the case of the Department of Public Works (Green Gazette, 2009).
- At a provincial level there may be specific legislative requirements that apply to all departments in the province or to certain departments in particular, such as the KwaZulu-Natal Appropriations Act (Act 1 of 2008) (Province of KwaZulu-Natal, 2008).

Chen, Chen, Huang and Ching (2006) indicate that different laws must be in place to set the foundation for e-Gov itself. The United States Government is cited as an example, having established the Privacy Act, the Computer Matching and Privacy Protection Act, the Electronic Freedom of Information Amendments, the Computer Security Act, the Critical Infrastructure Protection Act, the Government Paperwork Elimination Act and the Electronic Government Act. Thus, a number of legal and legislative requirements must be considered in implementing e-Gov, and ensuring such legislative compliance introduces its own type of complexity for G2G.

The environment in which G2G is implemented may also contribute to complexity. Daniels and LaMarsh (2007) indicate that complexity comes from the emergent and ever-changing environments in which software projects are executed. Thus, many of the problems faced in software projects are irreducible. The approach to handling complex problems is usually to break the problem down into smaller parts and manage each part. However, this does not work in a

complex system-of-systems environment. Similarly Heeks (2003:11) indicates that “the bigger and bolder the e-Gov project, the greater the risk of failure”. It would therefore appear that the G2G environment introduces its own type of complexity.

G2G often does not exist in isolation and will require some form of integration with other systems. The DPSA (2008) also indicates that system integration is an essential component of the South African e-Gov strategy. Similarly the DTSP indicates that inter-departmental alignment of plans is required to harness the full benefit of ICT for government (DTSP, 2014a). However, this integration may introduce additional complexity to G2G. One form of this complexity is integrating G2G systems with legacy applications. An approach to addressing integration complexity is to specify standards for integration and interfaces. Thus, the minimum interoperability standard (MIOS) specifies the legislated standards that all government applications must adhere to in order to facilitate system integration in the South African government (DPSA, 2008). However, legacy systems may not be MIOS-compliant and hence systems integration may still prove challenging. Another form of complexity related to integration is the number of different interfaces that are required. Ciborra (2005) highlights such challenges in integrating G2G systems with the case of the Jordanian Drivers and Vehicle Licensing Department. Legislative requirements had to be addressed, and integration across 35 different organisations had to be accomplished. In addition, some of the organisations had incompatible or non-computerised systems. Thus, it would appear that system integration introduces complexity to G2G.

The security of e-Gov systems is critical, not only to ensure the availability and delivery of e-Gov services, but also to ensure confidence and trust in the e-Gov system (Ebrahim and Irani, 2005). The DTSP confirms this view, highlighting increasing cases of identity theft and the need for ensuring that adequate security measures are built into ICT systems (DTSP, 2014a). However, ensuring adequate levels of system security also introduces an additional level of complexity. Security-related challenges experienced with G2G in South Africa are highlighted with the case of the Department of Transport’s eNaTIS system. Logical access control, and database and operating system security were identified as being inadequate to ensure data integrity, confidentiality and availability (AGSA, 2008). The FBI Trilogy Project in the United States Federal Government is another example of the complexity of e-Gov projects related in part to system security challenges. This arose mainly due to the number of uncertainties that existed in the project. Conflicts between system security and system robustness, and integrating secure and non-secure systems, were highlighted as challenges. The project was cancelled after \$170 million had been expended (Daniels and LaMarsh, 2007). In order to ensure adequate G2G security, security applications and tools must be considered, as a lack thereof may result in G2G failure (Ebrahim and Irani, 2005).

However, introducing additional security applications and tools adds another component to G2G, which may add to the complexity. Therefore, ensuring that G2G has adequate system security may also introduce complexity.

Technical complexities may also present challenges in G2G projects. Ciborra (2005) highlights the case of the Jordanian e-Gov project, where technical complexities abound. In particular these included the following issues:

- There were already existing applications in the technology landscape; hence, a number of different applications formed the “installed base” that had to be considered when designing a new solution. In addition, for inter-government and intra-government transactions it emerged that some applications and infrastructures were more advanced than others. Some applications and infrastructure were simply incompatible.
- Data quality was highlighted as a complex issue. Data duplication and redundancy issues emerged. Similarly, data-related issues are also highlighted in G2G applications in South Africa in the case of eNaTIS (AGSA, 2008), PERSAL (The Presidency, 2010) and HANIS (PMG, 2003).
- Challenges existed in converting the existing platforms. These challenges were related to non-centralised architecture, unsystematic updating of databases, non-relational databases and programs written in antiquated programming languages.

Ciborra (2005) summarises these technical challenges as uneven ICT readiness within the Jordanian public administration. This was related to the independence of the ministries, different practices employed in systems administration and the need for a deep culture change.

The complexity of G2G introduces different types of challenges. These types of challenges may relate to ensuring legislative compliance, integrating systems, ensuring adequate system security or technical complexities.

2.3.4 Government-to-Government Technology Infrastructure challenges

Appropriate technological infrastructure, such as networks, servers, routers and Internet connections are important for e-Gov success (Ebrahim and Irani, 2005; Gil-Garcia and Pardo, 2005). Research indicates that the success of e-Gov in a developing country relies on firstly ensuring that all the appropriate technological infrastructure is in place (Ndou, 2004; Dada, 2006; DoC, 2013b; DTPS, 2014a). This is also confirmed in the case of the implementation of the South African Department of Transport G2G eNaTIS application. Lack of appropriate technological infrastructure was identified as a challenge, resulting in poor application performance (AGSA,

2008). Lack of access to computer equipment such as PCs is another way in which the availability of technology infrastructure presents challenges to G2G. In developed countries civil servants usually enjoy a one-to-one ratio in relation to access to PCs. However, this is not the case in developing countries, and lack of access to resources means that civil servants continue with manual processes (Schware and Deane, 2003). Alternative access methods, such as cellular phones, mobile platforms, satellite receivers and kiosks, must therefore be considered so that e-Gov can serve all citizens regardless of financial or physical capabilities (Ndou, 2004; Mutula, 2012). Similarly, Ebrahim and Irani (2005) indicate that having multiple access channels is an important component for G2G as it takes into account how government employees and other government departments access G2G services. Thus, the lack of availability of technological infrastructure is one type of challenge to G2G. However, there are also other types of technology infrastructure-related challenges faced by G2G.

Schware and Deane (2003) indicate that appropriate telecommunications policies and legal and regulatory instruments must be in place to support technology infrastructure. In Jordan, for example, the Electronic Transaction Law allows for the transfer of documents electronically between government departments (Ciborra, 2005). In South Africa, however, the DTSPS has indicated that development of the ICT sector in the country has been slowed down due to policy constraints, legal bottlenecks and weak institutional arrangements (DTSPS, 2014a). The Electronic Communications and Transactions Act (Act No 25 of 2002) is highlighted as requiring several amendments to support the implementation of e-Gov in South Africa (DTSPS, 2015a). Thus, appropriate policy and legal frameworks are required to implement aspects of G2G. The lack of such policies and frameworks is one way in which the technology infrastructure may present challenges to G2G.

Allowing for more entrants into the telecommunications market, promoting the protection of intellectual property rights on the Internet and promoting online security are some of the requirements for e-Gov success (Schware and Deane, 2003). In this regard, research has shown that the more competitive the telecommunications industry and the more financial resources devoted to the development of ICT in a country, the better the e-Gov services. The existence of an independent national telecommunications regulatory authority has also been shown to improve the provision of e-Gov services (Gulati et al., 2012). In contrast, the South African telecommunications market is facing several challenges which hamper the use of ICT for government service delivery. These challenges include regulatory failure, limited competition, and failure to open the market (DTSPS, 2014a). Thus it would appear that the state of the telecommunications market in a country may present challenges to G2G.

Lack of access to the Internet may also present G2G challenges. Without Internet access, online government services will be of little value (Schware and Deane, 2003; Ndou, 2004). However, access to the Internet in Sub-Saharan Africa is 12.3 per 100 people (World Bank, 2011b). Although there has been some improvement in the provision of Internet access in Africa, such as the undersea fibre connectivity on the east coast of Africa (Mutula, 2012), access to the Internet still remains problematic. According to the DTSP, Internet access in South Africa as at 2013 is base-lined at 33.7% of the total population. This current lack of high-speed, high-quality, and affordable Internet access has had a negative impact on South Africa's development and global competitiveness. Businesses, citizens and public institutions have all been affected by the inadequate broadband access in the country, and in response the South African Broadband Policy has been developed (DoC, 2013b¹). Targets have been set to ensure that by 2016 50% of the country's citizens are connected with broadband access at 5Mbps, and that 50% of public-sector facilities have access at 5Mbps. In the long term, by 2030 all citizens must have broadband access at 10Mbps, whilst all public sector facilities must have access at 100Mbps (DTSP, 2014b). Fifteen areas were identified in South Africa with the biggest infrastructure gaps to implement broadband Internet access. Two out of these 15 areas were in KZN, with Qudeni being number 8 and Ndumo number 15 (DTSP, 2014b). It is therefore evident that access to the Internet poses a challenge to e-Gov in developing countries. However, Internet penetration rates in turn depend on Internet access costs. Although the prices of fixed and mobile data have been reduced in South Africa, the pricing of broadband Internet access remains a barrier to the use of ICT as an enabler, as well as a constraint on the investment potential in the country (DoC, 2013b). Hence it would seem that without affordable access to the Internet, G2G may face challenges.

The importance of government networks to support e-Gov is supported by the example of the Chinese government, which has sped up the construction of its network infrastructure. The network construction is concerned with ensuring that both internal networks within the Chinese government and external Web networks are able to support e-Gov implementation (Chen et al., 2006). The South African government has also recognised the need to provide adequate network infrastructure and has indicated that all schools, public health and other government facilities will be connected by 2020 through "substantial and superfast broadband capacity" (DTSP, 2014a). Schware and Deane (2003) also mention the lack of government access to networks and the costs associated with building networks as contributors to the failure of e-Gov. A benefit of e-Gov is the cost savings due to the increase in online transactions and more efficient information transfer (Ndou, 2004). However, if network costs remain high, such cost savings cannot materialise (Schware and Deane, 2003). Ndou (2004) illustrates this point with the case of the Gyandoot

¹ The National Broadband Policy was developed by the DoC in 2013. Since the formation of the DTSP in May 2014, the responsibility for implementation of the National Broadband Policy lies with the DTSP.

project in India, where an unreliable network infrastructure caused problems. This in turn affected the managers' motivation to participate in the project. The Indian Department of Telecommunications upgraded the quality and level of connections, and undertook studies into alternative solutions in order to improve the chances of the project's sustainability. Thus, government networks are an important consideration for G2G, and the adequacy and affordability of government networks are further types of technology infrastructure challenges faced by G2G.

Different types of challenges are faced by G2G in relation to technology infrastructure. These types of challenges include the availability of appropriate infrastructure, policy and regulatory frameworks, the state of the telecommunications market, access to and costs of Internet, and the availability and affordability of government networks.

2.4 MODEL OF E-GOV CHALLENGES

This section identifies and discusses an e-Gov model that may be useful in understanding the challenges of G2G. The Factor Model has been identified as relevant to this research since it specifically addresses the success and failure of e-Gov.

2.4.1 Factor Model

The Factor Model was developed by Heeks (Heeks, 2008) and presents various reasons for the success and failure of e-Gov based on a survey and case-study analysis in developing countries. The factors are categorised according to three broad categories (drivers, constraints and enablers) and each factor is placed on a continuum according to whether they encourage failure or encourage success (Heeks, 2008). Thus, each of these factors provides insight into the challenges that e-Gov may face in developing countries, and help establish an understanding of how each factor may contribute to either the success or failure of e-Gov.

The Heeks Factor Model also includes techniques for each factor that can be applied to reduce the risk of e-Gov failure. Figure 6 presents a summarised, graphical view of the Factor Model, whilst Table 4 describes in detail each of the factors along the e-Gov failure–success continuum.

The Heeks Factor Model is appropriate for this research as the model identifies and describes various factors that may lead to e-Gov success or failure. Thus the factors may be useful in understanding G2G challenges, which is the aim of this research.

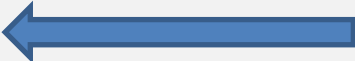

E-Gov Failure ←		→ E-Gov Success	
DRIVERS			
Lack of drivers		External Pressure	
		Internal Political Desire	
CONSTRAINTS		ENABLERS	
Strategy			
Lack of vision and strategy		Overall Vision and Strategy	
Management			
Poor Project Management		Effective Project Management	
Poor Change Management		Effective Change Management	
Dominant politics and self-interest			
Design			
Poor/unrealistic design		Effective Design	
Competencies			
Lack of requisite competencies		Requisite Competencies	
Technology Infrastructure			
Inadequate technological infrastructure		Adequate technological infrastructure	
Technological incompatibilities			

Figure 6. Graphical representation of the Heeks Factor Model (Heeks, 2008)

Table 4. Description of each e-Government success/failure in the Heeks Factor Model (based on Heeks, 2008)

E-GOV FAILURE ←		→ E-GOV SUCCESS	
DRIVERS			
e-Gov is likely to fail without understanding, ownership and support from within the government department. e-Gov cannot be driven solely by ICT vendors.		The drive for implementation of e-Gov and achievement of e-Gov goals must exist within government (from key stakeholders and officials) and from outside government (e.g. citizens).	
CONSTRAINTS		ENABLERS	
Strategy			
A stable policy and political environment is required. A lack of a long-term view, lack of guidance or lack of linking technology (the means) to achieve business goals (the end) are likely causes of e-Gov failure.		A vision and strategy for e-Gov must exist to identify how the goals of e-Gov will be achieved. The e-Gov strategy must be integrated into the broader strategy of the government department, and technology should be seen as the means and not an end to achieving government's business objectives.	

<div style="display: flex; justify-content: space-between; align-items: center;"> E-GOV FAILURE E-GOV SUCCESS </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> </div>	
Management	
<p>Ineffective procurement processes, weak or absent project controls and lack of clear responsibilities are causes of e-Gov failure.</p> <p>Clear project ownership is required, as multiple project owners may increase the likelihood of failure. Lack of stakeholder involvement and inadequate senior management support may also increase the risk of failure.</p> <p>The lack of senior management support could also send negative messages to other stakeholders, and contribute to difficulty in obtaining the resources required for e-Gov.</p> <p>The likelihood of e-Gov failure is increased where the focus of key stakeholders is on achieving personal goals. This often manifests itself in infighting amongst stakeholders, resistance due to loss of power, and copying of e-Gov solutions to boost one's reputation.</p>	<p>Effective project management must be applied, focusing specifically on clarifying responsibilities, effective planning, risk management, monitoring and control, and effective resource management.</p> <p>Leadership support must be visible with an e-Gov champion identified. Incentives should be used to create commitment, and stakeholders must be involved to minimise resistance and obtain support.</p>
Design	
<p>Lack of involvement from key stakeholders in the local environment may lead to designs that are unrealistic and mismatched to the current environment. Such design issues may emerge when external companies are involved, or when e-Gov is influenced by foreign donors.</p> <p>The failure to pilot an e-Gov application to assess its suitability, as well as an inappropriate fit of the design to the department's organisational structure, may also be contributors to e-Gov failure.</p>	<p>Stakeholders must be involved in the design so as to create designs that meet user needs in a real-life context.</p> <p>e-Gov should be implemented using an incremental or pilot approach, with realistic objectives that can be expanded over time.</p>
Competencies	
<p>Inadequate knowledge and skill amongst users, technical staff and business stakeholders may cause e-Gov to fail. Another cause of failure is a reliance on external skills.</p>	<p>Sufficient skills and knowledge must exist, especially within government departments.</p> <p>Skills in both technology and business management are required.</p> <p>Training for e-Gov must be planned for. Recruitment and retention practices must be in place for specialist e-Gov staff.</p>

E-GOV FAILURE		E-GOV SUCCESS	
			
Technology Infrastructure			
<p>The inadequacy of technology infrastructure, such as computers and networks, are contributors to the failure of e-Gov.</p> <p>Technical complexity issues, such as a difficulty or inability to interface between systems to share data, may also be a cause of failure.</p>	<p>Adequate technology infrastructure must be in place to support the implementation of e-Gov. Tried and tested technologies are preferred over “bleeding edge” technologies, whilst adequate support for the technologies must also be in place.</p> <p>e-Gov should be based on the current technology standards and capabilities available in a country, and not be based on future potential (where the country aims to reach).</p> <p>Appropriate telecommunications policies must also be in place.</p>		

2.4.2 Applying the Factor Model to this research

The Factor Model will be applied to analyse the research data in order to draw interpretations. The research data findings will be compared to the constructs of the Factor Model. Thus, similarities and differences between the model and the research findings will be identified. Using the Factor Model in this way, the researcher aims to lend credibility to the interpretations drawn.

2.5 PUBLIC MANAGEMENT THEORY

In this section the theoretical basis of public management is explored, followed by a brief discussion on developments in public management, New Public Management (NPM) and Digital Era Governance (DEG). Having provided appropriate background and insight into public management, this section concludes by describing how a public management theoretical lens will be applied in this research.

2.5.1 Public management theoretical basis

2.5.1.1 Traditional model vs managerialism

The traditional model of public management is the longest-standing theory of management in the public sector, having begun in the late nineteenth century and remaining largely unchanged in the Western world until the last quarter of the twentieth century (Hughes, 2003). The traditional

model of public management is characterised by a strict hierarchical model of a bureaucracy staffed by permanent, neutral and anonymous officials, who serve any governing political party equally, are motivated purely by public interest, are under the formal control of political leadership, and administer policies decided by politicians, without contributing to those policies (Pfiffner, 2004; Mukonza, 2014). These theoretical pillars are, however, no longer viewed as adequate to address the current reality of government, and the traditional model has been criticised for contributing to the underperformance of the public sector (Homburg, 2004; Chipkin and Lipietz, 2012). The four main problems with the traditional model are identified by Hughes as follows: (1) the model of political control is inadequate and illogical, and presents difficulties in separating politicians from administrators; (2) the “one best way” approach to dealing with a given problem results in detailed procedures being developed that limit individual thought and creativity, and allow administrators to evade responsibility for results; (3) bureaucracy in itself presents a problem, as it introduces issues of secrecy, rigidity and hierarchy, whilst also affecting efficiency; (4) public choice critique indicates that government bureaucracy restricts individuals’ freedom and does not necessarily provide the same benefits to individuals when compared to the market (Hughes, 2003).

Developments in public management in the 1980s and 1990s emerged in response to the inadequacies of the traditional model of public management. These developments placed greater emphasis on the responsibility of managers and the achievement of results (Hughes, 2003; Mukonza, 2014). Flexibility in organisations, personnel and employment terms are now favoured over the classic bureaucracy (Hughes, 2003; Pfiffner, 2004). Another change is the setting of key performance indicators for individuals and organisations in order to measure achievement; programmes are also more rigorously evaluated for achievement of goals (Fountain, 2001; Pfiffner, 2004; Doorgapersad, 2011). Senior staff are more likely to be politically aligned, whilst government functions are more likely to face market tests, meaning that although government may be involved it may not necessarily provide certain functions (Doorgapersad, 2011). Finally, government functions may be reduced through privatisation and outsourcing. The terms “public management” or “managerialism” have been used to describe the paradigm shifts described (Hughes, 2003).

2.5.1.2 The contingency approach

In comparing the traditional model of public management to managerialism, Fox et al. (2004) describe the earlier theoretical approach to management as a closed-systems perspective that investigates management phenomena in terms of internal variables, gives little attention to the impact of external variables on the management phenomenon, and places emphasis on the “one

best way” of doing things (Hughes, 2003). The closed-systems perspective has contributed to the limitations of the traditional model of public management and thus there has been a move towards a contingency approach to the theory and practice of management (Fox et al., 2004; Pollitt, 2005). The contingency approach views management and organisational phenomena as complex systems that comprise interrelated sets of variables and parts that collaborate to achieve objectives using inputs from the environment (Fox et al., 2004). The contingency approach therefore emphasises the importance of the environment or institutional contexts (Christensen and Laegreid, 2003; Bernadi, 2009), which affect the management of complex organisations. Another important feature of the contingency approach is that an organisation’s relationship with other organisations and its total environment are dependent on the situation in which the organisation finds itself (Fox et al., 2004). Thus there is no “one best way” or universal principles which are applicable (Hughes, 2003; Mukonza, 2014), and there is a need for managers to be adaptable, flexible and innovative in decision making and management styles (Homburg, 2004). The contingency approach facilitates strategic decision making by analysing the environment and assessing the situation in which an organisation finds itself (Fox et al., 2004).

2.5.1.3 Public administration theory on ICT

According to Snellen (2005), the theories on the use of information technologies in public administration focus on three themes:

- **Technological determinism:** Three positions that characterise how ICT is used in the public sector are distinguished. The *deterministic* position proposes that technological developments are autonomous and such developments determine how ICT should be and will be used in government. The role of the individuals involved in ICT and their scope for action, as well as the complex relationships between technology, embeddedness and behaviour, are pushed into the background. Thus this position implies that technology by itself will lead to greater productivity without the organisation needing to make any structural adjustments to fully integrate and use new technologies (Fountain, 2001). In contrast the *voluntaristic* position indicates that ICT itself has little power; how ICT is used is determined by the person/s who have the power to decide how ICT is used in government. The *mixed deterministic-voluntaristic* position is a hybrid between the two positions. It indicates that the use of ICT and the outcomes thereof are based on the interactions of actors and their intentions on the one hand, and technological and social circumstances on the other.
- **Organisational implications:** The use of ICT in the public sector is modelled on its use in the private sector. Business process re-engineering can be applied to reinvent the

organisation, helped by the use of ICT. This re-engineering is driven primarily to reduce costs and increase quality. Fountain (2001) indicates that cost reductions may be realised through work force reduction; computerisation automates manual tasks performed by individuals, combines several jobs into one, and empowers lower pay-grade employees to perform jobs that were classified at a higher pay grade. The use of ICT may also increase decentralisation and the term “e-lancers” is introduced, meaning “electronically connected freelancers”. It would thus seem that the working arrangements and working environment may be drastically transformed in the public sector with the assistance of ICT.

- **Policy implications:** ICT has implications for how policies are implemented and operationally managed (Mukonza, 2014). The workflow associated with the implementation and management of a policy can be aided by ICT. In particular, ICT can be applied in the co-ordination and standardisation of business processes, in the storage and retrieval of information used in the processes, in automated support for case handling, and in generating reporting and statistical information. One example of this is enabling the sharing of data between head offices and regional offices through ICT, by automating the data processing and making the data available in appropriate formats to policy decision makers and implementers (Fountain, 2001).

2.5.1.4 The effects of e-Government on bureaucracy

e-Gov affects bureaucracy in certain specific ways, as summarised below (Hughes, 2003):

- The organisation of government departments may be more aligned to information flows facilitated by technology, rather than by hierarchy. For instance, services can be grouped together on a website and governmental departments may be physically or virtually structured based on this grouping. Similarly, the data at decentralised field offices may be more easily available to government department head offices and vice versa (Fountain, 2001).
- Fewer management levels may be required as the information required by upper management may be obtained directly from a system. In addition, the level of supervision required will decrease through the use of systems and technology.
- The number of lower-level staff may decrease as manual, time-consuming tasks are performed electronically. In addition, lower-level staff may be able to perform more higher-level tasks with the aid of systems and technology. One example of this is the re-designing of the business processes of the Social Security Administration (SSA) in the United States, where telephone operators were retrained and computer systems reprogrammed to streamline the processing of claims from citizens. Thus lower-level staff

were now used in performing additional, higher-level functions previously performed by other dedicated staff (Fountain, 2001).

- The changes in staffing requirements will affect the hierarchy in the public sector, may lead to greater devolution of authority and may have an impact on career structures. ICT may be used to formalise the knowledge and know-how of skilled workers and may thus either be used to deskill work or complement and enhance the skills and abilities of workers (Fountain, 2001).
- ICT may affect the physical work environment of the public-sector personnel as remote access technologies allow them to work from home, or to conduct work which would normally be conducted on-site from the office, instead of travelling out to sites and arranging virtual teams across locations.

Public management theory has been dominated by the traditional model of public management. This model has, however, proved to be lacking and there have been paradigm shifts towards “public management” or “managerialism”. These paradigm shifts are supported by the contingency approach, which emphasises the importance of the environment and of the analysis of the current situation in which an organisation finds itself.

Theorising the application of ICT in public administration has focused on the themes of technological determinism, organisational implications and policy implications. In addition, e-Gov has several implications for bureaucracy.

2.5.2 New Public Management and Digital Era Governance

In 1991 “New Public Management” (NPM) emerged as a method of administrative reform in the public sector (Ferlie et al., 2005; Bernadi, 2009; Lapsley, 2009) and can be seen as one of the dominant international reforms (Schedler and Scharf, 2001). These reforms were an intentional effort by politicians and administrators to change the structure, processes or personnel of the public sector (Doorgapersad, 2011) and importantly contained some or all of the following elements: (1) a focus on increased efficiency; (2) increased market orientation; (3) devolution; (4) managerialism; and (5) the use of contracts (Fountain, 2001; Christensen and Laegrid, 2003; Pfiffner, 2004; Dunleavy et al., 2005; Bernadi, 2009; Mukonza, 2014). Viewed differently, NPM is seen as a reform that attempts to cut the red tape or break the bureaucracy (Schedler and Scharf, 2001).

NPM infuses private-sector managerial ideas and techniques into the public sector (Dunleavy et al., 2005; Lapsley, 2009; Tsankova, 2011) and two NPM sub-types can be distinguished: “hard NPM” and “soft NPM” (Ferlie et al., 2005). “Hard NPM” emphasises the measurement of outputs

and outcomes, performance management (Doorgapersad, 2011) and recognising performance through a reward-or-punish strategy (Pfiffner, 2004; Ferlie et al., 2005). In contrast, “soft NPM” emphasises quality improvement, individual development and learning, and is more user oriented. “Soft NPM” may incorporate strategies such as the culture-of-excellence model, high commitment, total quality management, learning organisation and business process re-engineering approaches (Ferlie et al., 2005).

NPM as a public sector reform is seen to be failing (Dunleavy et al., 2005; Lapsley, 2009). In one sense this failure can be attributed to the increased institutional and policy complexity introduced by NPM; this in turn has reduced the positive impact of NPM on social welfare. Thus, in summary, the very complexity introduced by NPM has limited the extent to which the intended objectives of NPM have been achieved and has led to a stalling or reversal of NPM (Dunleavy et al., 2005). Another explanation for the failure of NPM is that the technologies that NPM advocates have led to the disappointment and general failure of NPM. These technologies include the use of management consultants, the use of ICT for public-sector transformation, and the use of auditing and risk management to encourage compliance and reputation management (Lapsley, 2009). According to Mukonza (2014), NPM is more suited to the concerns of the developed world and does not adequately address capacity building and developmental concerns in the developing world. Dunleavy et al. (2005) go further to indicate that the stalling of NPM has led to a post-NPM regime being formed. This regime has a strong focus on ICT-centred changes in public management driven by advances in and the pervasiveness of technologies (e.g. Internet, e-mail and the web), and supporting fully digital modes of operation for government (Fountain, 2001; Dunleavy et al., 2005; Torres, Pina and Royo, 2005). Mukonza (2014) views this as the current paradigm and future of public management. Fountain (2001) uses the term virtual bureaucracy to describe the changes introduced by technology, and indicates that it comprises the following elements:

- **Information structure:** Information is structured using ICT instead of people, and the organisational structure is based on systems rather than people. Jurisdictional boundaries and functional differentiation become less clear.
- **Hierarchy:** Electronic and informal communications take place, and teams execute work and make decisions. There is a marked move away from the hierarchy of individuals and offices.
- **Files:** Files are available in digital format and are much more flexible. A variety of computing equipment can be used to store, access and analyse files.

- **Employee skill and career growth:** Employees become more empowered to execute their work and are cross-functional. Computer literacy and proficiency become key employee skills.
- **Business rules:** Standard operating procedures and general rules become rules embedded in information systems.
- **Processing time:** A move towards real-time processing becomes more feasible, instead of slow processing due to batch processing and multiple handovers in processes.
- **Feedback cycle:** Constant monitoring and status updates become possible, leading to more informed and rapid decision making.

Although NPM may have stalled, it has created fertile ground for e-Gov (Schedler and Scharf, 2001). According to Hughes (2003), the impact of rapid changes in technology started to affect government in the late 1990s, with a drive towards ICT-centred changes in public management. This ICT-centred regime can be viewed as “Digital Era Governance” (DEG) (Dunleavy et al., 2005; Doorgapersad, 2011), from which three distinct themes emerge:

- **Re-integration:** NPM separated certain elements of the public sector and their services, and the citizen or other civil society actors were burdened with integrating these services into a usable form (Dunleavy et al., 2005). DEG stresses reintegrating these services so as to eliminate fragmentation and complex inter-governmental networks (Snellen, 2005).
- **Needs-based holism:** The relationship between government and clients is simplified and transformed. These transformations can be described as a move from a one-service counter to multi-channel service delivery, and from a reactive to a proactive provision of services (Snellen, 2005). To enable these transformations, end-to-end process re-engineering is applied to create an agile government that can respond quickly and flexibly to changes in the social environment (Dunleavy et al., 2005; Snellen, 2005).
- **Digitisation changes:** Technology is no longer viewed as a supplement to providing public services; rather, it becomes a genuinely transformative solution and the opportunity to transition to fully-digitised operations is exploited (Dunleavy et al., 2005). Snellen (2005) indicates that ICT can be applied to support economy of implementation through workflow-management systems supporting the execution of business processes, providing front-end verification tools to validate information given by clients and hence fight fraud, and text building blocks which provide templates for communications with citizens.

NPM as a public-management reform is seen to have failed or come to a standstill, with DEG seemingly having become the post-NPM regime. Dunleavy et al. (2005: 467) go so far as to say that “NPM is dead, long live digital era governance,” whilst Mukonza (2014) states that e-Gov is the future of public management. However, there are also more cautious views that indicate it is

too early to judge whether e-Gov has surpassed other public-management reforms, and that it is more realistic to view NPM and e-Gov as mutually reinforcing (Schedler and Scharf, 2001; Hughes, 2003). There is, however, agreement that DEG is focused on the use of ICT in the delivery of services to citizens; it therefore is synonymous with e-Gov and G2G in particular. Thus DEG public management changes are relevant to this research.

2.5.3 Applying a public management lens to Government-to-Government

This section presents public management theories that have developed with regard to e-Gov, and therefore attempts to provide a contextualisation of e-Gov in relation to public management theory. Firstly, an evaluation is conducted of the Public Management model to identify how the technology environment influences public management (Fox et al., 2004). Secondly, DEG as a post-NPM paradigm is discussed (Dunleavy et al., 2005). Finally, an e-Gov conceptual framework in the context of NPM is discussed (Schedler and Scharf, 2001).

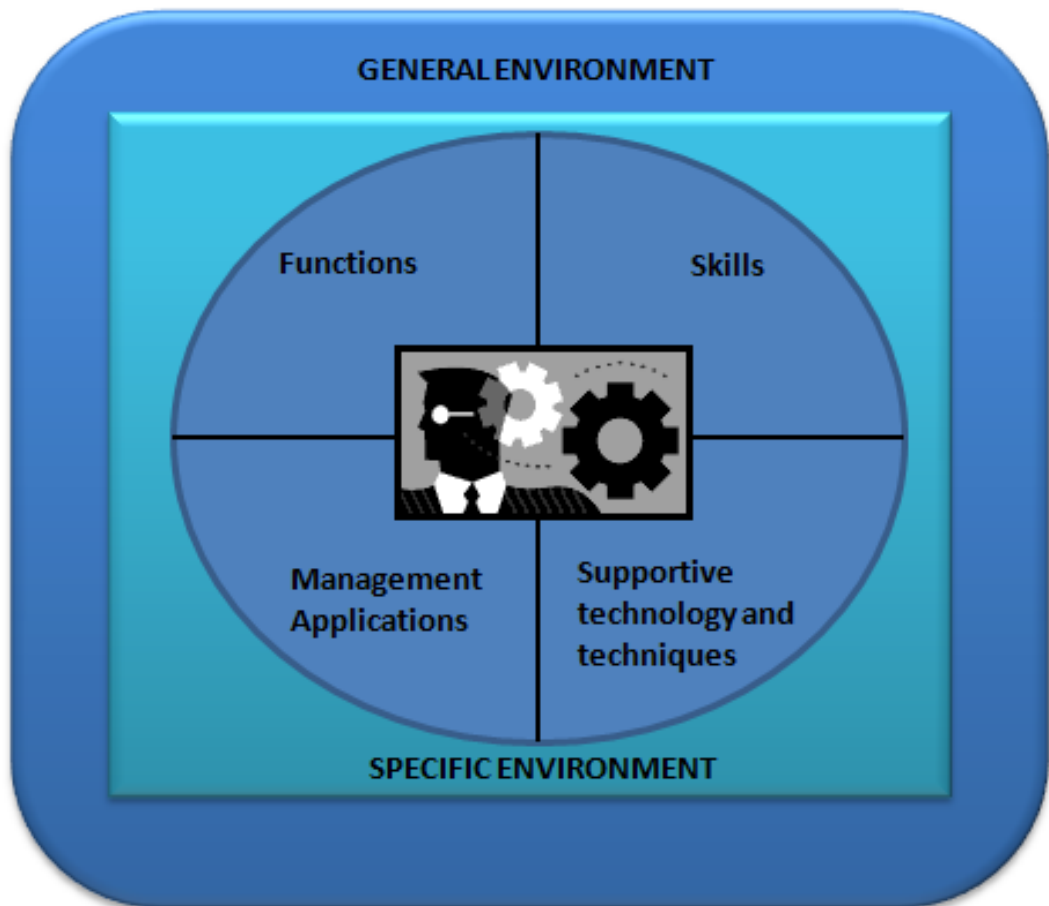
The public management theories identified in this section will be used to analyse and interpret the research data. Thus e-Gov and G2G challenges will be positioned within public management theory in order to deepen the understanding of the challenges identified in this research.

2.5.3.1 Influence of the technological environment on public management

One useful approach to understanding public management is through a Public Management model (Fox et al., 2004) as illustrated in Figure 7. The model highlights the key components that make up public management and places emphasis on the context within which public management exists (referred to as the “environment”). The components within the Public Management model are:

- **The environment:** the general (political, social, cultural, economic, technological) and specific (suppliers, consumers, regulators, competitors) environment that influences and affects public management functions, skills, applications, and supportive technologies and techniques.
- **Functions:** the management tasks and ongoing concerns of public managers, e.g. policy making, planning, organising, leading, control and evaluation.
- **Skills:** the professional and practical efforts to reach business objectives extending beyond theoretical knowledge, e.g. change and conflict management, negotiation, decision-making skills.

- **Management applications:** certain developments and applications that can be of use to public managers in the execution of functions and skills, e.g. policy analysis, strategic management, organisation development.
- **Supportive technology and techniques:** technological aids and other techniques that can assist in the execution of functions and skills, e.g. computer technology and public management techniques.



GENERAL ENVIRONMENT				
Political	Social	Economic	Technological	Cultural

SPECIFIC ENVIRONMENT			
Suppliers	Competitors	Regulators	Consumers

FUNCTIONS
Policy-making Planning Organising Leading Control and evaluation

SKILLS
Decision-making Communication Management of change Management of conflict Negotiation

APPLICATIONS
Policy Analysis Strategic Management Organisation Development

SUPPORTIVE TECHNOLOGY & TECHNIQUES
Computer technology and information management Techniques for public management

Figure 7. Public Management model (adapted from Fox et al., 2004)

The drive towards ICT-centred changes in public management can be explained through the Public Management model (Fox et al., 2004) as two key implications (highlighted in Figure 7 for ease of reference) can be observed. Firstly, in the Public Management model the technological

environment is part of the general environment that affects public management. As technology has advanced and become more widely used in today's civil society (Mukonza, 2014), this technological environment has influenced the public sector's move towards ICT-centred solutions (Hughes, 2003; Torres et al., 2005; Doorgapersad, 2011; Mukonza, 2014). Secondly, one of the components of the Public Management model is "supportive technologies", which includes "computer technology and information management" that are used to support public functions and skills. Thus the Public Management model clearly emphasises the need to exploit technology for enhancing public service delivery.

Having identified the importance of the environment in public management, it is necessary to understand it in more detail. Fox et al. (2004) distinguish between the general and the specific environment. The general environment refers to anything external to an organisation or outside an organisation's boundaries. This includes political (Pandey and Wright, 2006), social (Christensen and Laegreid, 2003), cultural (Christensen and Laegreid, 2003), economic (Christensen and Laegreid, 2003) and technological (Hughes, 2003; Lapsley, 2009; Mukonza, 2014) elements. The specific environment directly influences the resources available to an organisation, and is observable and directly experienced by the organisation. The components in the specific environment include suppliers (Christensen and Laegreid, 2003; Pfiffner, 2004; Dunleavy et al., 2005; Mukonza, 2014), consumers (Torres et al., 2005; Mukonza, 2014), regulators (Dunleavy et al., 2005; Lapsley, 2009) and competitors (Dunleavy et al., 2005). The specific environment is also a more concrete manifestation of the elements in the general environment. Thus, the general environment can have a widespread but subtle impact on the public sector, with these effects being experienced as more concrete, observable and possible through the specific environment (Fox et al., 2004).

The public sector is therefore forced to embrace, leverage or respond otherwise to ICT developments as its regulators, consumers, suppliers or competitors (specific environment) will have reacted to ICT developments in the general environment. Examples of this are as follows: (1) citizens making extensive use of e-mail and websites, hence governmental departments needing to provide platforms for electronic queries and needing to have a website with appropriate content; (2) regulators such as the Department of Labour requiring electronic submissions of employment equity plans and hence governmental departments needing to have the ICT solutions in place to prepare and submit such requirements online; (3) suppliers of services to government making use of ICT-based solutions such as e-Learning to provide training to government officials at a reduced cost and hence government department's needing to have the ICT solutions in place to leverage such offerings from suppliers.

The Public Management model also recognises ICT as an aid to support and enhance public-sector functions, skills and management applications. It is also reasonable to assume that the relationship is bi-directional, whereby the public sector functions, skills and management applications will also affect ICT. This view of ICT as a means to enhance public service delivery is aligned to e-Gov, which seeks to use ICT to enhance and streamline public sector service provision through ICT. It is also aligned to G2G in particular, which can improve integration between government departments to improve service delivery and allow for improved information sharing (Hughes, 2003; Mukonza, 2014). These ICT-centred drivers and influences on the Public Management model are highlighted in Figure 8.

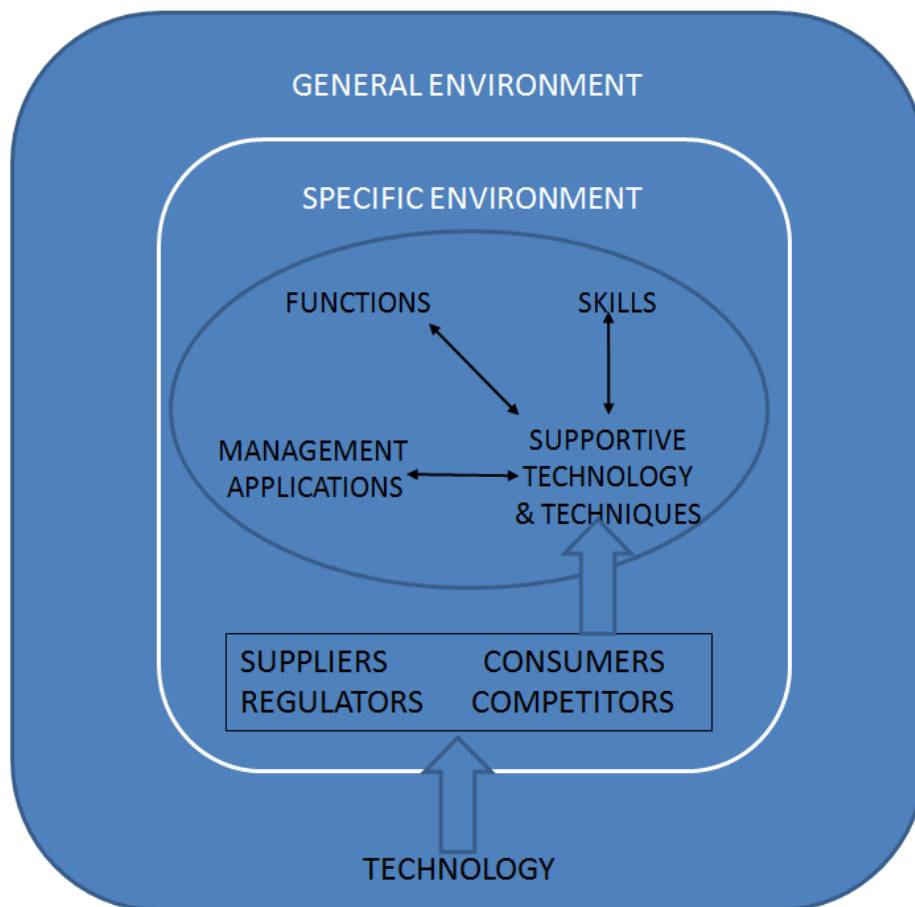


Figure 8. Effects of ICT on the Public Management model (adapted from Fox et al., 2004)

2.5.3.2 Digital Era Governance — Post-New Public Management

Dunleavy et al. (2005) indicate that NPM has now largely stalled and is being replaced with DEG, which provides an opportunity for self-sustaining change in various technological, social, cultural and organisational spheres, all of which are closely interconnected. As discussed earlier, Dunleavy et al. (2005) indicate that DEG can be viewed in terms of three themes: re-integration, needs-based holism and digitisation changes. Within each of these themes, several different components exist, which are summarised in Table 5.

Table 5. Themes and components of DEG, and associated impacts and implications on public management

Theme	Component	Impacts and implications
REINTEGRATION	Roll-back of agencification	Governmental structures and agencies that were created and possibly operating competitively will be assimilated into other government departments, merged, eliminated or forced to operate more co-operatively.
	Joined-up government	Government departments are integrated and are supported by extensive ICT integration.
	Re-governmentalisation	Activities which were previously outsourced to the private sector are reabsorbed into the public sector.
	Reinstatement of central processes	Similar, generic functions (e.g. recruitment, procurement) or duplicated processes are replaced by centralised processes.
	Radical squeezing of production costs	Staffing levels are reduced in the public sector primarily in departments making extensive use of ICT. Thus ICT is used to reduce manual or human tasks and introduce cost savings.
	Re-engineering back-office functions	Back-office functions are optimised by capitalising on the productivity improvements offered by newer ICT. This may include replacing legacy systems and replacing myriads of cross-cutting contracts with several ICT service providers. Back-office functions may also be re-designed by eliminating historical processes that are no longer relevant.
	Procurement	Procurement functions are consolidated to reduce the

Theme	Component	Impacts and implications
	concentration and specialisation	duplication of functions. Emphasis is placed on contracting innovatively, and specialised contracts are established to optimise the value realisation from procurement efforts — an example is the Government Wide Acquisition Contracts in the United States for ICT procurement.
	Network simplification	Regulatory overviews are simplified, together with simplification of the underlying networks, thus stopping the creation of multiple management teams and reducing unnecessary work. Dunleavy et al. (2005) refer to this as stopping the creation of “boutique bureaucracies”, which create a complex top tier of regulatory agencies, for a network of public agencies, and quasi-governmental or non-governmental bodies.
NEEDS-BASED HOLISM	Client-based or needs-based organisation	Agencies are reintegrated to serve a single client group. An example is the United Kingdom’s Pensions Service in the Department for Works and Pensions, which pulls together all the benefits for older persons under one administration.
	One-stop provision	Government agencies mesh service provision to eliminate the duplication of processes and reduce complexity for citizens and businesses. Services can be integrated through web-integration (primarily electronic), one-stop shops (multiple services from the same location) or one-stop windows (only the customer interface is integrated).
	Interactive and “ask once” information seeking	This involves government’s commitment to reusing information already obtained instead of gathering the same information each time. It is a move away from fragmented and silo administrative systems, and interactive systems such as call centres and online services are emphasised, taking a more holistic view of people’s needs.
	Data warehousing	Data warehousing makes data available proactively across multiple fields, allowing government agencies to anticipate

Theme	Component	Impacts and implications
		<p>citizen needs or key policy risks. This in turn allows agencies to match their services proactively. For data warehousing to be successful, a move away from silo systems and incompatible systems is required.</p>
	<p>End-to-end service re-engineering</p>	<p>The processes described above, together with the move towards web-based government information systems, have necessitated end-to-end service integration. Project teams are forced to think about the whole process and not be restricted by existing boundaries. A practical example of this is reducing the length of forms to be completed by citizens by automatically pulling existing information from disparate and dispersed ICT systems.</p> <p>A challenge associated with such changes is that existing agencies may feel threatened, as the re-engineering may pose questions about their existence itself; similarly, the extent of changes proposed may extend beyond the current incumbent's term in office.</p>
	<p>Agile government processes</p>	<p>The agile government concept holds the view that government agencies do not necessarily operate in a stable environment over the long term. Thus the public management and decision-making system must be capable of quickly reconfiguring to changing needs and responding effectively to an external environment that is volatile and turbulent. In an agile environment, emphasis is placed on achieving flexibility and responsiveness. Central to achieving this is the availability of information, and government stakeholders' ability to use this information quickly and efficiently to make decisions.</p>
<p>DIGITIZATION PROCESSES</p>	<p>Electronic service delivery</p>	<p>Electronic service delivery is concerned with transforming paper-based administrative processes to online government services. Important considerations for successful electronic service delivery are the availability of financial resources to provide and develop online services, citizens' uptake of the services provided electronically, and household access to the</p>

Theme	Component	Impacts and implications
		Internet. A centralised imposition of ICT solutions may also prove to be a means by which e-Gov solutions can be rolled out across diverse or dispersed government agencies.
	New forms of automated technologies	A particular focus here is the use of “zero touch technologies” (ZTT) which aim for complete process automation without any human intervention. The process logic is automated and only exceptions are flagged for monitoring and follow-up.
	Radical disintermediation	<p>This is concerned with providing citizens, business or any other civil-society actors with direct access to government systems without having to work through a government department or its personnel. End users are then able to search and select data which is of particular interest to them. An important consideration is to align what is offered by government and what is required by end users. Back-up and help-desk facilities must also be in place to support end users in optimising the use of such radical disintermediation solutions.</p> <p>A practical example of such solutions is use of a smart card system that involves online purchasing and loading of credits to use the rail system. An automatic reader can then be used for users to swipe the card and gain access to the train. This solution allows users to obtain what they require directly without any intervention from government personnel; it also results in cost savings by reducing ticketing staff, reduces queuing times and increases the use of rail services.</p>
	Active channel-streaming	<p>The initial position of adding electronic service channels to existing means of service delivery is recognised as inadequate; and the need to include multi-channel access emerges. This, however, brings with it additional costs and complexity.</p> <p>Governments actively encourage end users to switch to e-services and may either incentivise users (through reduced costs or improved quality of service) or compel the use of e-services through legal and regulatory means.</p>

Theme	Component	Impacts and implications
	Facilitating isocratic administration and co-production	<p>A shift from agency-centred to citizen/business-centred processes emerges, where end users self-administer their interactions with government. Isocracy is more than disintermediation and focuses on self-directed compliance. The assumption is that some people are predisposed to co-operate but do not want to feel as though their co-operation is in isolation, whilst others choose to defect without penalty. Thus government's administrative role changes to one of primarily providing assurance.</p> <p>Co-production is concerned with end users' partially producing outputs in conjunction with government. In digital-era government, citizens and business produce individual outputs through electronic processes, and government will need to provide a facilitating framework.</p>
	Moving toward open-book government	<p>Open-book government signifies a move from a "closed-book" government to one where end users have access to their own information (such as medical files and treatments, and tax accounts), and enables holistic government, data warehousing and greater self-administration. Applicable legislation to protect personal information whilst also promoting the sharing of applicable information is also seen as an enabler for open-book government. Open-book government also supports an increase in transparency, as end users can track and monitor applications and cases themselves.</p>

2.5.3.3 e-Government conceptual framework

Schedler and Scharf (2001) developed an e-Gov conceptual framework from the perspective of NPM. The framework attempts to understand e-Gov in the context of public management, and focuses on non-technical issues. Three process elements of e-Gov are identified: electronic democracy and participation (eDP), electronic production networks (ePN) and electronic public service (ePS). The impact of culture on e-Gov is established, and three management techniques relevant to the functioning of e-Gov are highlighted (knowledge management, process re-design and quality management). The process elements are organised in terms of a political decision-

making and production process, resulting in a design pattern for the e-Gov concept. To this, culture and management techniques are added to produce an e-Gov framework.

Process elements

Three process elements are distinguished, each with its own specific features and emphases. Collectively these process elements are seen as comprehensive e-Gov. eDP refers to decision-making processes in the political-administration sphere. ePN focuses on formal and informal networks, and can be executed in the background without any direct impact on customers and citizens. In contrast, ePS is visible to customers and citizens, and is shaped by the demands and abilities of the recipients of the services provided. Each process element is discussed briefly below.

- *Electronic democracy and participation (eDP)*: eDP is concerned with the use of electronic solutions for political opinion-building and decision making, such as e-voting. An important element of eDP is the inclusion of citizens in the political process. An important development in eDP is loosening the ties with respect to the time and place of a poll and decision making.
- *Electronic production networks (ePN)*: ePN uses technology to foster co-operation between public and private institutions, as well as across different public institutions. It makes possible the creation of a virtual network to fulfil public responsibilities, and at the same time it enables different stakeholders to work on the same product across geographic locations. Another benefit of ePN is the economies of scale introduced by process standardisation and through consolidating administrative activities. Examples of ePN include outsourcing the process of renewing government-issued documents (co-operation between public and private institutions) and centralised e-procurement solutions (co-operation between public and private institutions, as well as across different public institutions). The model also indicates that parts of an organisation may need to be split up and reconfigured optimally into a production network; parts of an external organisation may also need to be pooled into the virtual network to accomplish a task. The creation of an electronic product network entails the following: (1) analysing all the steps in the process, (2) dividing the process steps into those which can be outsourced and those which must remain within an organisation, (3) contracting with a third party, (4) conducting quality control, and (5) in more complex structures such as those with several independent parties, the responsible government department may also need to assume a supervisory role.
- *Electronic public service (ePS)*: The provision of public services through an electronic means to benefit recipients (citizens or business) is seen as ePS. Online tax declaration is

one example, and there is endless potential to the range of services that can be provided online. An ePS system should ideally allow the end user to enter required input data, and such data is automatically processed in real time as far as possible.

e-Gov culture

Schedler and Scharf (2001) describe culture as the position and actions of individuals within an organisation, including the performance of leaders. It also includes the commitment of an organisation to achieving common objectives, and the commitment of the organisation to training and support. Culture is recognised as one of the biggest obstacles to successful e-Gov implementation, primarily because e-Gov emphasises openness towards stakeholders. e-Gov also necessitates a change in the attitudes of various stakeholders, such as politicians, administration and civil society, towards the use of ICT. Cultural implications for e-Gov in particular include:

- *Publicising politics and administration:* e-Gov emphasises the notion of transparency in government by allowing the monitoring and reproduction of processes over the Internet. In addition, information is made directly and easily available through ICT systems for parliamentarians, and such information is not reserved only for the use of the administration and the government or political party in power. Information can also not be reshaped before being disseminated. Thus shifts in power may occur if the availability of information is seen to provide a power advantage.
- *Customer orientation:* The needs of the customers of the public service are recognised and their requirements are given priority. Solutions are therefore built around the customer.
- *Trust culture:* The ability to collaborate between individuals and between government departments becomes a reality with e-Gov. This in turn requires openness toward stakeholders and co-workers.
- *Technological disposition:* This is an essential prerequisite for e-Gov success, as employees and citizens must be open to the personal use of a computer and to ICT in general.

Management techniques

Certain management techniques can be applied to e-Gov to assist with its successful implementation. Three such techniques are discussed by Schedler and Scharf (2001) as summarised below:

- *Knowledge management*: Knowledge is recognised as a valuable resource in the public sector and can be categorised into explicit knowledge (available from files, libraries, databases, etc.) and implicit or tacit knowledge (the accumulated know-how, experience, creativity and skills that reside within individuals). Implicit knowledge is more difficult to capture and access. Reorganising processes in the public sector (including process changes introduced by e-Gov) can increase the risk of losing implicit knowledge, as the knowledge carriers move on to new tasks and their experience is no longer required. Thus, managing knowledge when e-Gov is implemented is an important consideration. Another key implication of knowledge management for e-Gov is establishing a cohesive communication network that enables knowledge sharing and organisational learning. Such a network becomes key for e-Gov as new processes are supported by ICT (such as e-procurement), as these e-Gov-enabled processes will rely on effective knowledge-sharing to improve the quality of the implementation. Additionally, e-Gov may lead to organisational changes such as an increase in outsourcing and contracting out, decentralisation or an increase in the physical distance between offices. Thus knowledge sharing is also important, even for existing 'known processes', to support these organisational changes made possible by e-Gov.
- *Business process re-engineering*: Business process re-engineering (BPR) aims to optimise an organisation's processes, and thus improve productivity. The redesign efforts are outcomes-focused and ICT is seen as a key enabler. One implication of BPR for the public sector is that whilst private-sector processes may provide a useful basis, they can often not be directly applied in the public sector. Public-sector processes may consist of case-based decision making, where a process may differ from one case to another, and thus there is a reliance on individuals and their knowledge. There are, therefore, some processes that cannot be formalised. In addition, other implications of BPR in the public sector include the following: (1) the process redesign cannot focus solely on productivity, and may need to consider political, legal, professional and economic implications; (2) a clean-slate approach cannot always be applied due to regulatory requirements for government departments; and (3) BPR fundamentally requires thinking in terms of processes as opposed to thinking in terms of the labour specialisations by means of which governments are often currently organised.

- *Quality management:* Comprehensive quality management in the public sector is concerned with the efficiency, effectiveness and adequacy of public services. In addition, quality in NPM has a strong customer orientation and the following quality dimensions are identified: (1) product-oriented quality (the quality of the end product and how it is supplied to customers); (2) customer-oriented quality (which includes customer satisfaction and making an impact on service recipients through service delivery); (3) process-oriented quality (minimal errors in the production, speed and efficiency of how a product is developed); (4) value-oriented quality (a concern with whether a service is worth its price); and (5) political quality (the quality of the service as judged by the political bodies in terms of how the service benefits policy. This includes benefits to society (e.g. standard of living) and social benefit (e.g. social peace)).

Summative model

A design pattern for the e-Gov concept emerges from the organisation of the process elements in terms of a political decision-making (how policy is developed) and production (how public services are produced and delivered) process. Decision-making processes develop through relationships from *eDP–internal processes–ePS* and the measure of the quality of the decision making is effectiveness. Production processes develop through relationships from *ePN–internal processes–ePS* and the measure of the quality of the decision making is efficiency.

The e-Gov culture and management techniques can also be incorporated into the process elements to formulate an e-Gov framework (Schedler and Scharf, 2001) as shown in Figure 9.



Figure 9. e-Gov framework (adapted from Schedler and Scharf, 2001)

Gaps in the model

A gap which the authors of the model recognise is that it focuses on non-technical issues, and the technical issues related to e-Gov are ignored. Schedler and Scharf (2001) also recognise that the model does not include contextual variables, and that this is one of the fields where further research is required.

The model in its summative form as shown in Figure 9 includes three elements that are not explained or described explicitly by the authors. In particular, the relevance and impact of e-Gov strategy, technology and resources are not described in detail. It may be assumed that “technology” is synonymous with the technical issues that the authors state as an exclusion in the scope of the model. Similarly, it may also be assumed that “resources” refers to the contextual variables which are also recognised as an area for future research. In discussing the model, “strategy” is mentioned, although in a fragmented manner. The key discussion around strategy in this model is as follows:

- e-Gov can be seen as a technology-driven reform, where the developments in modern ICT have created the potential for such reform strategy. The authors thus summarise this technology-driven reform as “structure follows strategy follows potential”.
- The success of e-Gov depends on a top-down visionary strategy.
- BPR requires an integrated view of process redesign that is based on a clear strategy that emphasises the integration of systems in a consistent manner.

2.6 CONCLUSION OF LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK SUMMARY

2.6.1 Summary of literature review

User adoption, human resources skills, complexity and technology infrastructure have been identified in the literature as challenges facing e-Gov and G2G specifically. An overview of the challenges identified in the literature review is presented in Addendum 4. In addition, examples of these challenges in a South African G2G context have been identified in the literature review. A summary of these examples is provided in Addendum 3.

2.6.2 Summary of conceptual framework

The Factor Model identifies and describes the different challenges facing e-Gov that thereby contribute to its success or failure. This model is therefore applicable in identifying and understanding the challenges facing G2G in the KZN DoT.

Public management is concerned with the achievement of objectives with maximum efficiency in the public sector, and ICT is seen as one means to realise this goal. Public management theories are thus applicable to ICT in the public sector and G2G in particular. Relevant public management ICT-related theories have been identified and discussed in section 2.5, and these theories have been applied to the research findings so as to deepen the understanding of G2G challenges. A multi-faceted approach to the public management ICT-related theories approach has been undertaken, comprising the following: (1) understanding how ICT impacts on and is impacted by the environment by situating e-Gov in the Public Management model; (2) viewing e-Gov in relation to a development in public management, New Public Management (NPM); and (3) understanding an e-Gov conceptual model rooted in public management.

The e-Gov and public management theories can be combined to provide a conceptual framework for this research as shown in Figure 10. The framework provides the basis for analysing and interpreting the data findings related to the challenges facing G2G.

2.6.3 Gaps in literature

Even though a number of e-Gov studies have been identified in the literature, a gap in the literature has been identified with respect to studies specifically focusing on G2G. The literature review has also highlighted a divorce between the fields of public management and e-Gov, although it is acknowledged that these two fields are closely related and interdependent.

There is also a dearth of studies pertaining to e-Gov in the context of the South African government. Nevertheless, the literature review has provided an understanding of the challenges of G2G, and provides a basis for exploring G2G challenges in the KZN DoT.

Having identified gaps in the literature and having developed a suitable conceptual framework drawing on both e-Gov and public management, Chapter 3 discusses the research methodology that has been applied in this study.

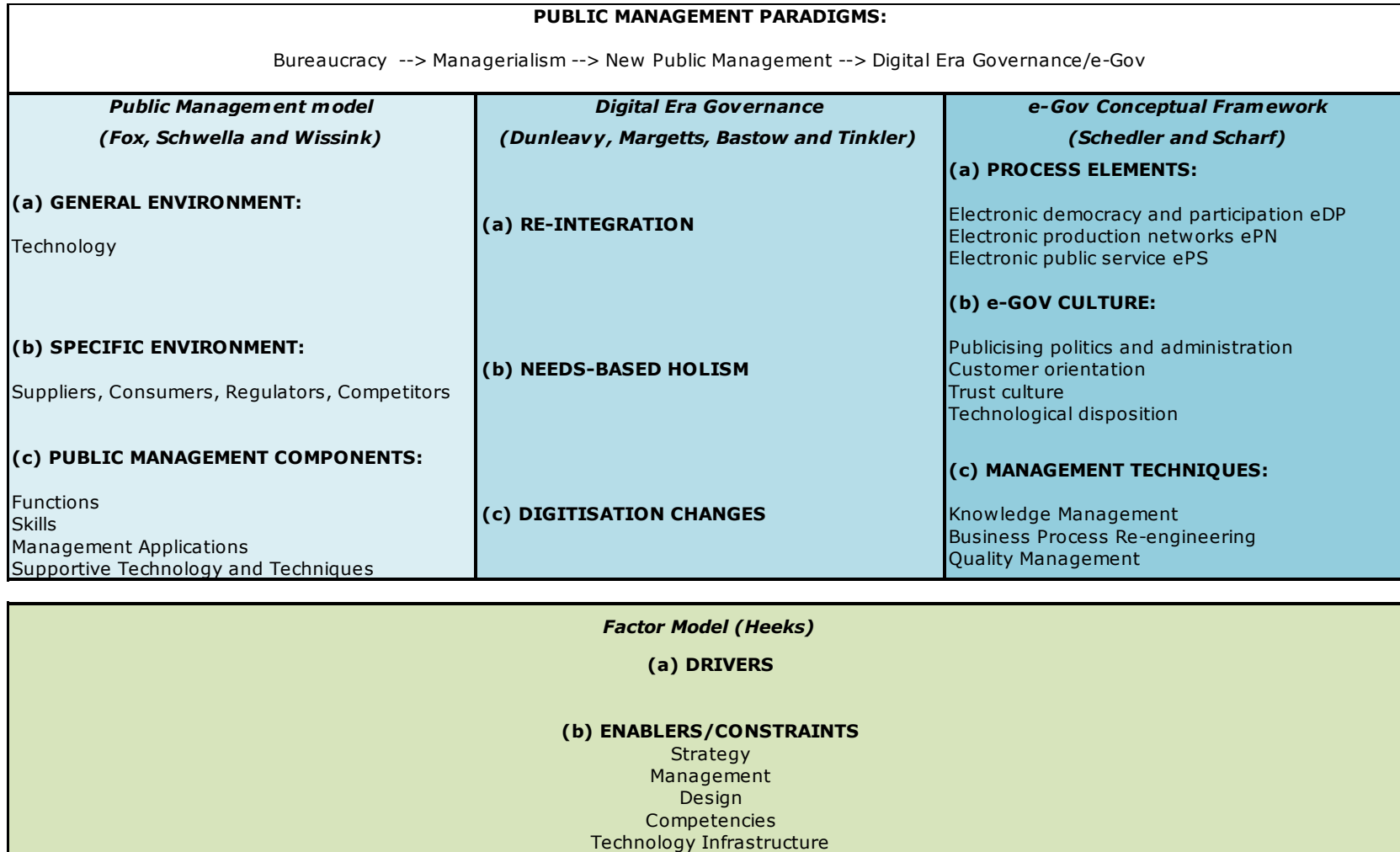


Figure 10. Challenges of G2G: conceptual framework

CHAPTER 3

RESEARCH METHODOLOGY

This section describes the research methodology and design that has been used to conduct the research. The study site and population sample are discussed, followed by a discussion of the research instrument that has been used. The procedures for data collection, data analysis and interpretation are also discussed. The reliability and validity of the research is thereafter discussed. The chapter concludes by presenting the ethical considerations and delimitations of this research.

3.1 RESEARCH APPROACH/PARADIGM

A paradigm is a common understanding or a set of shared assumptions about some aspect of the world. Thus a research paradigm is different communities' shared way of thinking about how to conduct research (Oates, 2006). Interpretive research is a research paradigm premised on the idea that there is no universal truth. It recognises that social phenomena are unlikely to be determined according to strict laws of nature, due to the lack of a closed system and the many extraneous variables in the social environment (Gregor, 2002). Interpretivism attempts to understand and make interpretations from the researcher's own frame of reference and asserts that it is not possible to remain completely neutral as a researcher (Fitzgerald and Howcroft, 1998; Henning, Van Rensburg and Smit, 2004). In information systems, interpretivism is concerned with the social and organisational context of an information system (Klein and Myers, 1999). It focuses specifically on the social constructs according to which information systems are developed and construed by people. It also focuses on how the information system influences and is influenced by its social setting (Fitzgerald and Howcroft, 1998; Oates, 2006; Yin, 2011). Klein and Myers (1999) also indicate that interpretive research has the potential to produce deep insights into phenomena related to information systems.

Interpretivism is an appropriate research paradigm for this research because G2G is a type of information system that exists in a social context, the social context being a government department and the employees who use and participate in the development of the G2G system. The factors that have been identified in the literature as potential G2G challenges (user adoption, complexity, technology infrastructure and human resources skills) are largely social factors that affect how G2G information systems are developed and implemented. Similarly, G2G challenges can be viewed in terms of how G2G influences and is influenced by its social context. Thus the interpretive paradigm has been adopted as the appropriate paradigm for this research.

Research methodologies can be broadly divided into two categories: quantitative and qualitative research (Henning et al., 2004; Oates, 2006). Quantitative methodology often uses mathematical and statistical techniques to identify facts and causal relationships, whereas qualitative methodology focuses on describing the nature of the things that exist instead of how many exist (Fitzgerald and Howcroft, 1998). Qualitative methodology also provides a “thick” description, is concerned with the discovery of patterns in research data, and attempts to understand or explain such patterns (Fitzgerald and Howcroft, 1998; Henning et al., 2004).

A qualitative research methodology will be used for this study. One reason why the qualitative methodology is considered to be appropriate for this study is because it emphasises the importance of the stated meanings of participants and on the stated meanings participants attach to themselves, to other people and their environment (Fitzgerald and Howcroft, 1998; Eysenck, 2004). Viewed differently, qualitative methodology looks at people’s perceptions of their world and aims to understand phenomena through the meanings and values that people assign to them (Klein and Myers, 1999; Oates, 2006; Creswell, 2007; Heeks and Bailur, 2007; Yin, 2011). In this research, the phenomenon is G2G and the aim of this research is to understand the challenges affecting G2G, based on the meanings and values of G2G role players. Thus, a qualitative methodology is suitable in identifying G2G challenges and determining how G2G challenges affect G2G.

Research has also been conducted on the methodologies used in e-Gov research. It has been determined that quantitative research is the dominant approach in e-Gov research (Heeks and Bailur, 2007; Irani, Weerakkody, Kamal, Hindi, Osman, Anouze and El-Haddadeh, 2012). Lacity and Janson (1994: 137) go further to indicate that there is a lack of qualitative studies in the field of information systems (IS) research in general, observing that “almost all IS articles published in leading IS journals in the previous decade continue to report the results of quantitative studies”. Thus there is a gap in terms of qualitative studies conducted in e-Gov. This qualitative research has attempted to contribute towards closing the gap identified in the literature.

3.2 RESEARCH DESIGN

A case-study research design has been adopted for this study as it allows the researcher to study a complex phenomenon within its context (Creswell, 2007; Baxter and Jack, 2008; Miles, Huberman and Saldaña, 2014). A case study focuses on one instance of the phenomenon that will be investigated within a bounded system, uses various data-generation methods, and aims to obtain rich and detailed insight into the life of the case, and the complex relationships and processes (Henning et al., 2004; Oates, 2006; Creswell, 2007; Denscombe, 2007). The case-study

design is therefore appropriate for this study as it allows the researcher to investigate the phenomenon (G2G) and obtain rich insight into the challenges facing G2G, by focusing on specific cases. The case-study design also allows for the investigation of potential relationships and processes that may exist between challenges, and how these potential relationships and processes could affect G2G.

Another reason why the case-study design is appropriate is because this study aims to answer “how” questions (“how” do the identified challenges affect G2G?). This study also aims to uncover contextual conditions that may be relevant to G2G or the contextual conditions that may be relevant to the challenges affecting G2G. Finally, the case-study design is appropriate because the boundaries between the phenomenon (G2G) and the context (of G2G and G2G challenges) are unclear (Baxter and Jack, 2008)

There are three basic types of case study: exploratory, descriptive and explanatory (Oates, 2006; Denscombe, 2007). This research uses a descriptive case study since it provides a rich and detailed analysis of G2G and the real-life context of G2G. The analysis also tells the story of what occurred from the perspective of and according to the perceptions of the different role-players involved in G2G (Baxter and Jack, 2008).

The boundaries of the case must be defined so that it is clear what will be studied and what will not be studied (Henning et al., 2004; Creswell, 2007; Baxter and Jack, 2008; Miles et al., 2014). Defining the boundaries of the study also ensures that the scope of the study remains reasonable (Baxter and Jack, 2008). Miles et al. (2014) indicate that the boundaries of the case are further defined by the sampling that is performed in the research. Sampling is discussed further in this chapter; however, the boundaries of the case in this research are outlined below, emphasising four key boundary points: G2G site, timelines for implementation of the G2G system, the definition of G2G applications and G2G challenges.

- **G2G site:** The KZN DoT is the research site and the site forms the boundary of the case.
- **Timeline:** This research has focused on G2G systems that have been implemented at the research site over a period of five years (between 2008 and 2013). It also includes G2G systems that have not yet been implemented at the research site, but whose implementation was under way at the time of data collection (October 2013 to December 2013).
- **Definition of G2G:** G2G refers to systems that are used within a specific government department or systems used across different government departments (inter- and intra-government) (Ndou, 2004; PNC, 2012). This includes those systems that support back-office functions of government, where the back-office functions support the delivery of

front-line or core government services (United Nations, 2008). Examples of types of G2G applications include those that facilitate processes in finance, human resources, legal services, document management systems, marketing and communications (Ebrahim and Irani, 2005; United Nations, 2008), as well as G2G applications that support, automate and integrate business processes related to the core services that a government department provides (Ebrahim and Irani, 2005; Yildiz, 2007). An example of the latter is the eNaTIS system that is used within the DoT to manage traffic infringements and issue driver's licenses (Cloete, 2012).

- **G2G challenges:** In this study a “challenge” increases the likelihood of failure of G2G, or, viewed differently, reduces the likelihood of success of G2G. Thus there is also a need to define what is meant by e-Gov “failure” and “success”. Heeks (2002) indicates that success and failure in e-Gov initiatives can be categorised into three classes: total failure, partial failure and success. This categorisation is useful and covers the spectrum of possible outcomes of e-Gov initiatives. Thus Heeks's (2002) definition of e-Gov success and failure is also adopted for the purposes of this study:
 - Total failure: Refers to an e-Gov initiative that was never implemented or a situation in which a new system was implemented but immediately abandoned.
 - Partial failure: In this case major goals are not attained or there are significant undesirable outcomes of the e-Gov initiative.
 - Success: Most stakeholder groups attain their major goals and do not experience significant undesirable outcomes.

The boundaries of this case are shown diagrammatically in Figure 11.

G2G does not refer to systems that make government services accessible to citizens through technology (referred to as G2C) or systems that make government services accessible to businesses through technology (G2B) (Ebrahim and Irani, 2005; Yildiz, 2007; United Nations, 2008). Thus G2C and G2B fall outside the scope of this case study.

In order to define clearly which systems are considered to be G2G and can be included in the scope of this study, criteria have been defined as described in Table 6. The systems are considered for inclusion in this study based on who the users of the system are, and on what type of functionality the system provides. Provision is also made for considering cross-functional systems that may provide some elements of G2G, while at the same time also providing G2B and/or G2C services.

Table 6. Criteria for inclusion of systems in study

Criteria	Inclusion in study	Exclusion from study
User base of system	Mainly government department staff — within one department (intra) or across multiple departments (inter).	Not considered if users are only citizens or business (G2C or G2B is more applicable in this case).
System functionality	<p>System supports/automates business functions and processes related to:</p> <ul style="list-style-type: none"> • Department’s support services such as HR, supply chain management, asset management and finance; or • Delivery of department’s core services as per department’s mandate, e.g. motor vehicle licensing, issuing of identity documents and capturing learner’s examination results. However, the system <i>must</i> provide functionality to support/automate the back-end processes required to deliver the services, i.e. what the department/s must do for the service to be delivered to citizens. 	<p>Excluded if the system is concerned only with making the service available to citizens or business (G2C or G2B is more applicable) and the back-end processes required to deliver services are not within the scope of the system.</p> <p>For example, if a system provides <i>only</i> for citizens to complete online forms, and submit applications and supporting documents, then that system would be excluded. To be considered G2G, the system should also incorporate some functionality to route such documents and processes to departmental stakeholders and support the departmental stakeholders in assessing and processing the applications.</p>
Cross-functional systems	<p>Systems that support some element of intra/inter-government processes (i.e. support a department in executing its business processes), and at the same time also provide for the service to be accessed by citizens and business, are included. Such systems are seen to have a G2C/G2B and a G2G element.</p>	Excluded if intra/inter-government processes are not supported by the system.

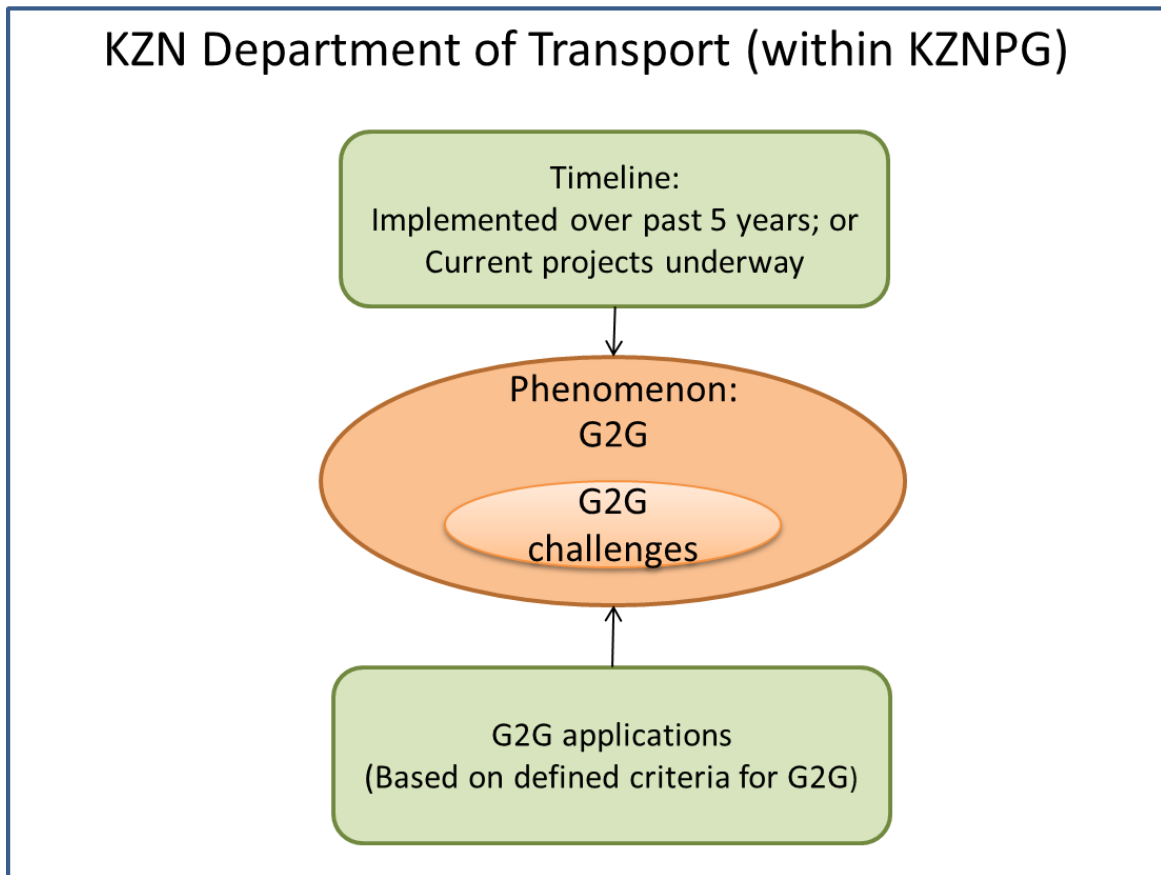


Figure 11. Defining the boundaries of the case

3.3 STUDY SITE

The researcher has chosen the KZN DoT as the field site. The KZN DoT is situated in the province of KZN in South Africa and comprises 66 sites spread across the province. The types of sites, physical locations of the sites, and the number of sites per type are defined in Table 7.

Table 7. Geographical spread of KwaZulu-Natal Department of Transport sites (adapted from KZN DoT, 2012a)

Type of site	Physical location	Number of sites per type
Head office	Pietermaritzburg	1
Regional offices	Pietermaritzburg, Durban, Ladysmith, Empangeni	4
Cost centres	Across the province	12

Smaller sites (e.g. Motor Licensing, Traffic Camera Office, Weighbridges)	Across the province	49
TOTAL		66

ICT support and services are provided to the KZN DoT by the State Information Technology Agency's KZN office (SITA KZN) (KZN DoT, 2012a; SITA, 2014). Thus SITA KZN also forms part of the research site. SITA offices in KZN are located in Pietermaritzburg and Durban (SITA, 2014).

The KZN DoT and SITA KZN have been chosen as the research sites due to the researcher's accessibility to stakeholders within these environments, and the researcher's knowledge that these departments have experience in the implementation of G2G. To the researcher's knowledge, no prior studies on the challenges of G2G in the KZN DoT have been conducted.

3.4 TARGET POPULATION AND SAMPLE

3.4.1 Target population

The target population comprises every instance in the category being researched (Denscombe, 2007). Thus the target population of this research is the set of all stakeholders involved in G2G in the KZN DoT, inclusive of stakeholders from SITA KZN who have been involved in G2G in the KZN DoT. This includes technical staff involved in the design, development and implementation of G2G (such as developers, analysts and project managers) and business stakeholders (such as system users, business managers and executives, and ICT managers). While the total staff complement in the KZN DoT is 4 005 (KZN DoT, 2013a) the target population of this research is the 1 629 staff who are users of ICT (KZN DoT, 2012a) and hence have potentially been involved in G2G. SITA KZN comprises 99 staff who service the KZN Provincial Government; this includes 13 support staff. Thus 86 staff in SITA KZN (total KZN Provincial Government staff less support staff) have potentially been involved in G2G in the KZN DoT. Therefore, the target population of this research is 1 629 staff from the KZN DoT and 86 staff from SITA KZN.

3.4.2 Sample and sampling method

A sample is a portion of the entire population who have been selected to participate in the research (Denscombe, 2007). Samples can be selected using probabilistic and/or non-probabilistic sampling techniques. Probabilistic sampling means that the selection of respondents is representative of the overall population of the study, whereas non-probabilistic sampling means that the researcher does not know if the sample is representative of the population or not, and that each respondent may have unique characteristics that other respondents in the population do not share (Oates, 2006; Denscombe, 2007). In this study, non-probabilistic sampling techniques have been used. Non-probabilistic techniques are used when the researcher believes that having a representative sample is not feasible or necessary (Oates, 2006; Denscombe, 2007); in this study it would not be possible to obtain a representative sample as the costs and time required would be too great considering the size and diversity of the target population (Denscombe, 2007). Another reason why non-probabilistic sampling was used in this study is because it is likely to yield the most plentiful and relevant data for the topic of a qualitative study (Yin, 2011). The non-probabilistic sampling strategies used in the selection of the research sample were a combination of purposive and convenience sampling based on the following reasons:

- **Purposive:** Purposive sampling is where the researcher deliberately selects the sample by choosing respondents that will likely produce valuable data that meets the research objectives (Oates, 2006; Denscombe, 2007; Miles et al., 2014). Respondents who were known to have had experience in G2G in the KZN DoT were identified. They were likely to produce valuable data to meet the purposes of the research and focus on the unique context of the case (Miles et al., 2014). In order to obtain multi-dimensional views, the purposive sampling also aimed to obtain inputs from respondents from different disciplines, who were or had been involved in G2G in the KZN DoT.
- **Convenience:** Convenience sampling refers to the selection of samples because they are accessible geographically and can be gathered within the time frames suitable to the research (Denscombe, 2007; Miles et al., 2014). Convenience sampling also refers to the selection of respondents based on their willingness to participate (Oates, 2006). Thus the researcher chose respondents who were easy to reach geographically within KZN, as well as participants who had agreed to participate in the study.

The sample size refers to the number of people or units selected to participate in the research (Denscombe, 2007). In this study the sample size was 15 respondents across the KZN DoT and SITA KZN. This sample size is believed to be adequate for this study based on sample sizes of similar studies conducted, as highlighted in Table 9. Thus the researcher believes that a sample size of 15 respondents has yielded adequate data for the study.

The sample comprised G2G users, management and technical staff who had been involved in G2G, as summarised in Table 8. The nature and definition of G2G requires that the users of G2G come from within a government department. Hence, there are no users from SITA KZN in the sample. Similarly, the technical staff involved in the design, development and implementation of G2G come from SITA KZN, since SITA KZN provides ICT services to government departments in the KZN Provincial Government. Hence, there are no technical staff members from the KZN DoT in the sample.

Table 8. Summary of sample by department and Government-to-Government roles

Department	Role in G2G			Total
	User	Management	Technical	
KZN DoT	5	3	0	8
SITA KZN	0	2	5	7
TOTAL	5	5	5	15

Table 9. Sample sizes of similar studies

Name of study	Study type	Research methodology	Sample size	Reference
<i>The Performance of Government IT Officers in e-Government Policy Implementation</i>	Masters in Management in ICT Policy and Regulation	Qualitative	8	Nengovhela (2012)
<i>Government-to-Government e-Government: A case study of a Federal Financial Program</i>	PhD	Qualitative	8	Faokunla (2012)
<i>Success Factors in e-Government Policy</i>	PhD	Qualitative	12	Chaijenkij (2010)

<i>Development and Implementation: The e-Revenue project in Thailand</i>				
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3.5 DATA COLLECTION INSTRUMENTS

Interviews and document analysis have been chosen as the data collection instruments for this study.

3.5.1 Interviews

An interview is a particular kind of conversation between people where one person wants to gain information from another (Arksey and Knight, 1999; Henning et al., 2004). An interview is usually planned in advance, there is consent to participate, it has an agenda and the researcher steers the discussion towards his or her topic of interest (Arksey and Knight, 1999; Oates, 2006). Yin (2011) identifies two types of interviews: structured interviews and qualitative interviews. Structured interviews use a formal questionnaire with a list of questions; the researcher formally adopts the role of interviewer, and applies consistent behaviour and demeanour throughout all interviews. In contrast, qualitative interviews are not strictly scripted and the researcher follows a conversational mode (Yin, 2011). A key distinction between structured and qualitative interviews is in the types of questions asked: the former uses closed-ended questions, where interviewee responses are limited by the researcher, while the latter uses open-ended questions, allowing respondents to use their own words to answer questions and even to query the researcher (Denscombe, 2007; Yin, 2011).

Qualitative interviews are used in this study. According to Eysenck (2004), qualitative interviews are more appropriate for qualitative research than structured interviews. Qualitative interviews are appropriate for this study as they allow participants to express their understanding using their own words and based on their own experiences and cognitive processes. In this way the researcher gains an understanding of a complex social world from the participant's perspective (Arksey and Knight, 1999; Denscombe, 2007; Yin, 2011). Thus, since G2G is a complex phenomenon and this research aims to understand the challenges of G2G in the KZN DoT from the perspectives of the stakeholders involved in G2G, qualitative interviews were deemed more suitable than structured interviews. In addition, qualitative interviews allow for in-depth investigations (Arksey and

Knight, 1999; Oates, 2006; Denscombe, 2007) that appreciate trends and contextual conditions from the participant's perspective (Yin, 2011), an approach that is congruent with the aims of this research.

The research instrument was developed based on the literature review and informed by research instruments used in similar studies (Chaijenkij, 2010; Matavire et al., 2010; Faokunla, 2012). Addendum 2 details the actual instrument that was used. Data analysis had commenced prior to the completion of interviews, thus earlier interviews generated additional interview questions included in later interviews. This approach contributed towards obtaining an in-depth understanding and generated reminders to obtain more detailed information about particular sub-topics (Arksey and Knight, 1999). The instrument was piloted first with one participant to identify any potential ambiguities, vagueness or misalignment between the instrument and research questions (Arksey and Knight, 1999). The interviewee with whom the research instrument was piloted came from the target population (SITA KZN technical staff) and possessed expert knowledge in the field of e-Gov and G2G in particular. The pilot interview was not considered an actual interview in this research and data gathered did not form part of the field data. The research instrument was modified after the pilot interview; in particular, the wording and structure of interview questions were changed to provide more clarity on the questions. Thereafter, the remaining interviews were conducted.

3.5.2 Document analysis

Written documents may take the form of government publications and official statistics, newspapers, magazines, records of meetings, letters and memos, diaries or website pages (Denscombe, 2007). Documents are a valuable source of information and if available should be included in the design of qualitative research (Henning, et al. 2004). Henning et al. (2004) go further to indicate that any document, whether printed or electronic, old or new, may be of value so long as it is related to the research questions. Additional benefits of using documents as a source of data in research is that they can usually be obtained easily and cheaply, are often readily available and can be collected unobtrusively, and documents available in the public domain can be accessed by other researchers, who can scrutinise the research based on the documents, thus giving the research credibility (Oates, 2006; Denscombe, 2007).

For this research, documents related to G2G in the KZN DoT, or making specific reference to G2G in the KZN DoT, have been used as part of the document analysis. The sampling method for documents was therefore purposive, as the researcher identified specific documents that were applicable to the study, and other documents that were not considered to be relevant were not analysed. The interviewees in this study also identified some of the documents that could be

included in the study. The documents that were analysed include various KZN DoT Request for Proposal (RFP) documents and one Position Paper on the ICT systems in the KZN DoT (KZN DoT, 2013b). The former documents are available on the KZN DoT website and are in the public domain, while the latter document has been obtained from stakeholders in the KZN DoT. The KZN DoT Strategic Plans, Annual Reports and Annual Performance Plans have also been reviewed by the researcher but these documents have not formed part of the document analysis, as there was insufficient G2G-related data contained therein.

3.6 DATA ANALYSIS

Dey (2005) describes data analysis as breaking down the data into its constituent parts in order to reveal the characteristic elements and structure of the data. In qualitative analysis the core processes involved are describing the phenomenon, classifying it and seeing how the concepts interconnect (Dey, 2005).

In this study the qualitative data has been analysed using thematic analysis and qualitative coding. Thematic analysis is the process of identifying key themes in the data, by assigning a label describing the theme to a unit of data (Oates, 2006). Thematic analysis may also be seen as descriptive coding or open coding, which is conducted at the outset of data analysis to organise the data according to what it describes (Maxwell, 2009; Lewins and Silver, 2010). The themes may be deductive (derived from existing theories and literature, or may be pre-developed by the researcher), or inductive (derived from the categories used by the respondents, so as to generate theory from the data) (Oates, 2006; Lewins and Silver, 2010). Dey (2005) indicates that thematic analysis is useful for funnelling data into relevant categories for analysis, and lays the foundation for making connections between the data components. It is also a form of data condensation that identifies prompts or triggers for deeper reflection on the meaning of the data (Creswell, 2007; Miles et al., 2014). In this study, thematic analysis has been used as the basis of the data analysis and was used to identify the key themes in the data related to the challenges of G2G. The initial themes were inductive, with *a priori* codes emerging from guided analysis of the literature. Further inductive themes also emerged from the data during the data analysis.

A code is a label assigning symbolic meaning to the segments of field data (Miles et al., 2014). Qualitative coding is the process of identifying segments of data that relate to, or are an example of, a more general idea, instance, theme or category (Lewins and Silver, 2010). Four types of interrelated codes are: categories or themes, causes or explanations, relationships amongst people and theoretical constructs (Miles et al., 2014). In this study the types of codes used are *categories or themes* that are refinements of the initial themes identified during thematic analysis; and *causes or explanations*, which are used to explain the G2G challenges or provide possible causes for the

challenges. Thus, qualitative coding has been applied in this study to add a more detailed layer of meaning to the data coded descriptively during thematic analysis. Qualitative coding has also been used to explore the relationships between codes (Maxwell, 2009; Lewins and Silver, 2010).

In this study, thematic analysis has been applied in conjunction with qualitative coding. Miles et al. (2014) describe these processes as first- and second-cycle coding, where the first cycle of coding is an initial way of condensing and summarising data, and the second cycle works on the first-cycle codes and is a way of grouping summaries into patterns that are more meaningful. Similarly, Yin (2011) describes the processes as the disassembling and reassembling of data, indicating that these two processes may be repeated several times and that it is iterative and recursive in nature (Henning et al., 2004; Lewins and Silver, 2010; Yin, 2011). The application of thematic and qualitative coding in this study also attempted to implement the principles of interpretive field studies in information systems (Klein and Myers, 1999). In particular, the analytical techniques used in this study attempted to:

1. implement the fundamental principle of the hermeneutic circle by analysing the interdependent meaning of the parts of the data and the whole that the data forms through identification of themes and codes in the field data;
2. implement the principle of contextualisation by coding data in such a way as to retain the context of the data; and
3. implement the principle of multiple interpretations by identifying themes and codes in such a way as to recognise differences in views and interpretations from the participants in the study.

Computer Assisted Qualitative Data Analysis (CAQDAS) is software that is designed to assist in the analysis of qualitative data (Henning et al., 2004; Lewins and Silver, 2010). NVivo 10 has been used as the CAQDAS in this study. It has been applied to conduct the data analysis and interpretation, as well as to maintain the history, progress and version control of the research project. Chapter 4 describes the application of NVivo 10 in this study in detail.

Gregor (2006) defines five theory types in information systems: analysis, explanation, prediction, explanation and prediction, and design and action. “Explanation” information systems theories are concerned primarily with explaining *how* and *why* a phenomenon occurs, and making testable predications about the future is not a primary concern. This research therefore belongs to the “explanation” theory type, since it provides an explanation of the phenomenon of G2G in South African provincial government (including causal reasoning for relationships among the phenomena) but it does not aim to make predictions with any precision and neither does it provide any testable propositions. “Explanation” theory types can also be viewed in terms of two sub-

types: sub-type 1 focuses on sensitisation, which provides a high-level view; sub-type 2 focuses on a lower-level explanation for how and why things happen in a real-world situation (Gregor, 2006). The latter sub-type is more elaborate than the first, as it states the dimensions or characteristics of a phenomenon and the structural interrelations between dimensions or characteristics (Gregor, 2002). This research is part of the latter sub-type, as it uses the KZN DoT as a case study to understand the phenomenon of G2G and explains in a lower level of detail the challenges faced by G2G. Thus this research is based on a descriptive case study used for theory building, where the theory that is produced by the research is a theory for explanation.

3.7 OVERVIEW OF THE RESEARCH PROCESS

An overview of the research process used for this study is described in Figure 12, which illustrates how the research question was formulated, what research design was used, what data-generation method was used and how the data was analysed.

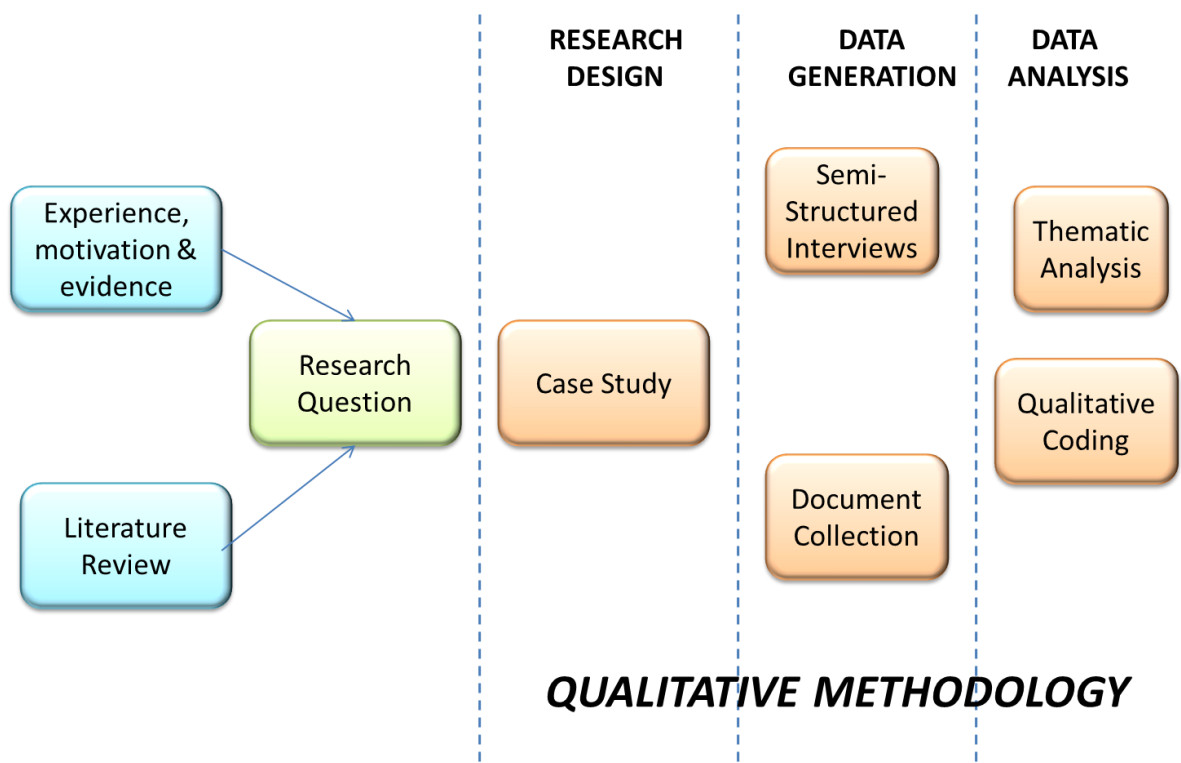


Figure 12. Model of the research process (adapted from Oates, 2006)

3.8 VALIDITY AND RELIABILITY

3.8.1 Validity

Even though the term “validity” is contested by qualitative researchers, the findings of a qualitative study must make sense, be credible to the people being studied and to readers, and provide an authentic portrayal of the phenomenon being studied (Miles et al., 2014). Thus validity can be seen in part as collecting and interpreting data in such a way that the conclusions are an accurate reflection of the real world (Yin, 2011). Miles et al. (2014) further define external validity as the persuasiveness of the case made by the researcher that the findings of the study are transferable to other contexts.

In this study, several guidelines were applied to improve validity as described in Table 10.

Table 10. Guidelines applied to improve validity in this study

Validity (synonymous with internal validity)		
Guideline	Source	Application in this research
Descriptions are context-rich, meaningful and thick.	Creswell (2007) Maxwell (2009) Yin (2011) Miles et al. (2014)	The analytical approach in this research has retained the context of the data. Quotes directly from the field have been used to illustrate examples of findings, with further elaboration on the context.
Triangulation refers to the goal of identifying at least three ways in which a particular event, description or fact reported in a study can be verified or corroborated (Yin, 2011). Triangulation among complementary data sources and methods can be used to improve	Creswell (2007) Denscombe (2007) Jha (2008) Maxwell (2009) Yin (2011) Miles et al. (2014)	Triangulation was applied in this research in the following ways: 1. Data source: the interviewees represented three different groups, i.e. users, technical and management. 2. Research instruments: interviews and documents

<p>validity and produces generally convergent conclusions; if the conclusions are not convergent, then explanations are provided to explain the results. Miles et al. (2014) add data type to the approaches to triangulation and include qualitative texts, audio/video recordings and quantitative data as different data types.</p>		<p>were used.</p> <p>3. Data type: qualitative texts (interview transcripts and documents) as well as audio recordings of the interviews were used.</p>
<p>Respondent checking of the study's descriptions and interpretations can be applied. The conclusions of a study are thought to be accurate according to the study participants, and coherent explanations are provided if there are participants who disagree with the conclusions.</p>	<p>Oates (2006) Creswell (2007) Jha (2008) Maxwell (2009) Yin (2011) Miles et al. (2014)</p>	<p>The researcher went back to the respondents in the study to confirm the accuracy of the findings and conclusions. All respondents agreed with the findings and conclusions, and no discrepancies were noted.</p>
External validity		
Guideline	Source	Application in this research
<p>The findings of the study are congruent with, connected to, or provide confirmation of prior theory.</p>	<p>Miles et al. (2014)</p>	<p>In the data analysis and interpretation, existing theories were evaluated against the findings from the field data. In addition, the research instrument used for interviews was based on prior studies and adapted as required for this study (Chaijenkij, 2010; Matavire et al., 2010;</p>

		Faokunla, 2012).
<p>Interpretivism acknowledges that each research situation is unique, and in social sciences it is unlikely for a social phenomenon to be determined strictly in accordance with laws of nature (Gregor, 2002). However, some generalisation is possible and the concept of <i>transferability</i> may be applied (Oates, 2006). Transferability is achieved by providing sufficiently detailed, thick descriptions so that readers can judge for themselves whether their own situation has similar features (Miles et al., 2014). Readers can judge if the findings may be relevant to their situation as well. Emphasis is placed on readers determining for themselves.</p>	<p>Gregor (2002) Oates (2006) Creswell (2007) Miles et al. (2014)</p>	<p>This study has attempted to provide adequate detail on analysis and interpretation, interweaving data directly from the field, in order for readers to judge the transferability of the research findings.</p>

3.8.2 Reliability

Reliability is the extent of the quality and integrity of a study. It is dependent on whether the process used in a study is consistent, and has reasonably stability over time and across methods and researchers (Miles et al., 2014). In this study, several guidelines were applied to improve reliability as described in Table 11.

Table 11. Guidelines applied to improve reliability in this study

Reliability		
Guideline	Source	Application in this research
In interpretive studies reliability can be improved by describing how well the research process is recorded and how well the data is documented and retained.	Oates (2006) Jha (2008) Miles et al. (2014)	A complete audit trail of the research process and the research findings was maintained. The use of NVivo 10 has assisted in maintaining an automated audit trail, and maintaining version control of the research project.
The research instrument can be tested prior to implementation to identify potential bias and ambiguity, and maximise reliability.	Arksey and Knight (1999) Kothari (2004)	The research instrument was piloted with one interviewee prior to conducting the interviews with research participants. This pilot served to confirm whether the questions were clearly understandable by participants, and whether the interview questions assisted in answering the research questions. In addition, the researcher paid attention during the interviews to body language so as not to distract or lead the respondent. The researcher also actively attempted not to ask any leading questions.
In qualitative data analysis, reliability refers to the ability to consistently recode the same data in the same way over time.	Creswell (2007) Busch, De Maret, Flynn et al. (2012)	In this study, coding rules were constructed clearly, documenting the rules that allowed for categorising and coding in the same way over the duration of the study. In addition, NVivo 10

		functionality to support coding, such as node hierarchies and framework matrices, assisted in ensuring the consistent coding of the data.
Peer or colleague review may be applied to obtain an objective view, since the researcher may begin to make interpretations from his or her own subjective perspective.	Creswell (2007) Jha (2008) Miles et al. (2014)	A review was held with an independent colleague who is also an e-Gov practitioner. This review focused on verifying the interpretive approach and conclusions that were drawn in this study. The inputs and recommendations from the review have been considered in this final analysis.

3.9 ETHICAL CONSIDERATIONS

Gatekeepers' letters were obtained from the KZN DoT and SITA KZN. These letters were submitted together with the application for ethical clearance from the University of KwaZulu-Natal Ethics Committee. Ethical clearance was obtained from the Ethics Committee prior to conducting any field work.

Prior to the interviews, interviewees were briefed about the background and objectives of the study. The interviewees were also given the opportunity to ask additional questions about the research, which the researcher responded to. The interviewees were advised that participation in this research is voluntary and anonymous, and that they could withdraw at any time should they wish to do so. Interviewees were then provided with an Informed Consent form, which they were asked to read and sign only if they were comfortable with participating in the research. The interviewees' identities have been kept anonymous in this study, and pseudonyms have been used instead of real names. The interviewees have chosen the pseudonyms used.

3.10 LIMITATIONS OF THE STUDY

A case-study research design has been used in this research, with the research site being the KZN DoT, a government department within the KZN provincial government. Thus, generalisability of the research findings is limited due to the research design (Simon, 2011). One response to this limitation is to provide detailed descriptions of research findings and analysis, including quotes from field data and contextual information (Denscombe, 2007), and this has been incorporated into the study. This will allow readers, potentially from other government departments in KZN or from government departments in other provinces, to judge for themselves whether the research findings have similarities and can be applied to their circumstances (Denscombe, 2007).

Another potential limitation of the study is that it does not focus on one specific G2G system in the KZN DoT. Rather, interviewees have provided their experiences with different G2G systems in the KZN DoT that met the criteria of being defined as a G2G system for the purposes of this study (see Addendum 7, which summarises the systems mentioned by interviewees). Incorporating multiple systems may be seen as a possible limitation of the study, as it may be argued that focusing on one system could have provided a more in-depth account of the challenges of G2G.

CHAPTER 4

FIELDWORK AND DATA ANALYSIS TECHNIQUES

This chapter provides an overview of the fieldwork and data processing conducted as part of this research. The profiles of the interviewees who participated in the study are provided together with the profiles of documents that have been analysed and the profiles of the G2G systems that emerged in the field data. The data analysis approach and techniques used are described. Finally, the use of Computer Aided Qualitative Data Analysis Software (CAQDAS) as part of this research is explained.

4.1 FIELDWORK

4.1.1 Research sites

Two sites were used for this research: the KZN Department of Transport (DoT) and the State Information Technology Agency (SITA). SITA is the ICT arm of the South African government and provides ICT services to national and provincial government departments, including the KZN DoT. These sites were chosen because staff at the KZN DoT and SITA have experience in implementing G2G in the KZN DoT.

4.1.2 Profile of respondents

Fifteen respondents were interviewed as part of this research. In-depth, semi-structured interviews were conducted, using purposive and convenience sampling. All interviewees had experience of G2G in the KZN DoT. This experience was confirmed with interviewees prior to scheduling the interviews.

The interviewees come from various backgrounds: management, technical or user of G2G. “Management” interviewees include people who play a strategic role and are typically senior staff. “Technical” interviewees include people who play a role in the development, implementation and support of G2G. “Users” refers to people who use G2G as part of their operational functions in the department. The users may have also had experience during the implementation of G2G.

The interviewees have been given pseudonyms and actual names are not used. The interviewees were asked to choose a pseudonym by which they would prefer to be known. This pseudonym is

used throughout the research. Addendum 6 provides the detailed respondent profiles and also describes the experience that the interviewee has on G2G projects. Table 12 provides a statistical view of the interviewees' profiles.

Table 12. Statistical view of interviewees' profiles

Gender		Organisation		Type	
Male	53%	KZN DoT	53%	User	33%
Female	47%	SITA	47%	Technical	33%
				Management	33%

4.1.3 Document analysis

Document analysis was used in this research to complement the interview data. The documents served as a form of triangulation, since the interview data was compared against the documents to identify supporting and contradictory views.

Different types of documents were analysed; however, all documents focused on or made reference to G2G. Four documents were used in this study. The documents were identified based on the researcher's knowledge of existing documents that provide insight into G2G in the KZN DoT. Preliminary discussions with interviewees also identified documents that could be used for this research. The profile of the documents analysed is shown in Table 13.

Table 13. Profile of documents analysed

Document type	Document name	Reference	G2G focus
Request for Proposal	<i>Request for Proposals for the Provision of Information Technology Operations, Technical Support and Services Solution for the KZN Department of Transport.</i>	KZN DoT (2012a)	<ul style="list-style-type: none"> Describes the technical support that will be provided for G2G from an ICT infrastructure perspective.

Document type	Document name	Reference	G2G focus
Position Paper	<i>Position Paper: IT Systems in the KwaZulu-Natal Department of Transport.</i>	KZN DoT (2013b)	<ul style="list-style-type: none"> • Describes existing and proposed G2G systems in the department. • Identifies G2G challenges and proposed solutions.
Request for Proposal	<i>Business Solutions Service Level Agreement for the KZN Department of Transport.</i>	KZN DoT (2012b)	<ul style="list-style-type: none"> • Describes the technical support that will be provided for G2G from an HR and skills perspective. • Describes existing and proposed G2G systems in the department. • Describes governance structures and mechanisms that will be implemented to support G2G.
Request for Proposal	<i>Request for Proposals for Enterprise Architecture Project for the KZN Department of Transport.</i>	KZN DoT (2012c)	<ul style="list-style-type: none"> • Identifies G2G challenges and proposed solutions. • Describes strategic direction for systems, including G2G, in the Department.

4.1.4 Profile of Government-to-Government systems

This research did not focus on any one specific G2G system. Instead interviewees were asked to describe the G2G systems in the KZN DoT that they have been involved in, and these systems formed the profile of the G2G systems included in the study. The criteria applied for inclusion of systems in the scope of the study are based on the user base of the system and the functionality that the system provides (see detailed description of criteria in Table 6). Ten different systems meeting the criteria of G2G as defined for this study emerged from the interview data and are shown in Addendum 7. To ensure anonymity, the actual system name is not provided, and instead a generic system name is used.

4.2 DATA PROCESSING

4.2.1 Data collection

Interviewees were briefed on this research and were invited via e-mail to participate. The interviewees were also informed that experience with G2G was a prerequisite for participation. All 15 interviewees who were invited to participate accepted the invitation and confirmed their G2G experience. Thereafter, interviews were scheduled at times convenient for the researcher and interviewee.

Prior to commencing the interview, interviewees were once again briefed on the objectives of the research. The researcher provided an overview of the consent form, and interviewees were given the opportunity to read through and sign the consent form. The researcher requested permission to use a voice recorder. Where permission was granted, the interview was recorded. The researcher also made notes during the interview. The average duration of the interviews was 75 minutes, with the shortest interview being 49 minutes and the longest interview being 109 minutes.

The interview was guided by the research instrument (Addendum 2); however, the line of questioning varied depending on the conversations that emerged during the interview. Since preliminary data analysis had commenced prior to the completion of all interviews, earlier interviews also provided some insight into the line of questioning that the researcher should follow for later interviews. Thus earlier interviews generated additional interview questions. After each interview, the researcher listened to the recordings and transcribed the interviews. The transcribed interviews were uploaded into NVivo10 to begin the analysis. Addendum 5 provides an example of one interview transcript.

4.2.2 Data analysis approach

Whilst thematic analysis and qualitative coding are the data analysis and interpretation approaches used for this study, the researcher has found that in order to operationalise thematic analysis and qualitative coding, there is a need to provide more structure to the analysis of the data in this study. Thus an overarching data analysis approach called “Framework” has been identified and adopted (discussed below), supported by specific qualitative data analysis techniques and CAQDAS (discussed in the following sections).

The Framework approach has been used for data analysis in this research. This is a qualitative analytical approach involving distinct, interconnected stages. It provides a well-defined procedure

for data analysis, thus ensuring that the analytical process is well documented and accessible (Ritchie and Spencer, 1994).

There are five key stages in Framework as illustrated in Figure 13. It can also be seen from Figure 13 that Stages 2 to 5 are iterative and were repeated several times. This iteration is not a specific guideline of Framework but rather how the approach was applied in this research. Table 14 describes each stage of Framework in detail and explains how it has been applied in this research.

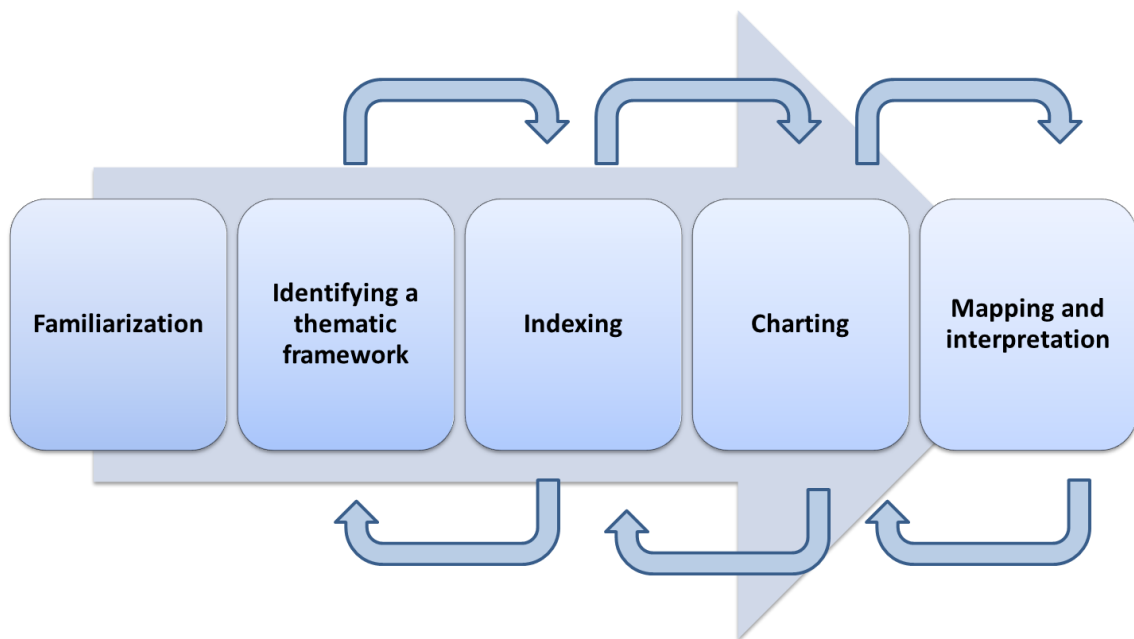


Figure 13. Stages in “Framework” (adapted from Ritchie and Spencer, 1994)

Table 14. Applying “Framework” to this research

Framework stage	Description of stage	Application in this research
Familiarisation	This stage involves immersion in the data before sorting and sifting begins. The analyst gains a holistic view of the data and gains a feel for the material as a whole.	The researcher listened to all recorded interviews and read through the written interview notes in order to become familiar with the data. Documents used in this research were also reviewed. Initial notes and memos were developed during the review of documents and interviews.

Framework stage	Description of stage	Application in this research
Identifying a thematic framework	Key issues, concepts and themes are identified. This becomes a thematic framework according to which field data can be sifted and sorted.	Using initial notes and memos from the familiarisation stage, as well as the themes and issues identified in the literature, a thematic framework was developed. This thematic framework was constructed in NVivo 10 and became the initial node hierarchy.
Indexing	This refers to the process of applying the thematic framework to the data in a systematic way.	Indexing can also be viewed as “coding” (Bryman and Burgess, 1994). NVivo 10 was used to code data according to the thematic framework or node hierarchy. As the coding progressed, the node hierarchy evolved in accordance with emerging themes from the data.
Charting	Charting involves developing a picture of the data as a whole. This is accomplished by considering and analysing the interviewees’ responses, experiences and attitudes to themes and issues. Data is “lifted” from the original context and rearranged in accordance with the themes identified.	NVivo10 was used extensively for the charting process. Queries and reports allowed the researcher to examine and interrogate the data, whilst visualization tools in NVivo 10 allowed the researcher to explore and compare data across interviews, documents and themes. The data was exported to Microsoft Excel for further analysis.
Mapping and interpretation	This stage involves pulling key characteristics of the data together so that the data can be mapped and interpreted as a whole. During this stage, patterns and connections are searched for, and explanations for these patterns and connections are sought from within the field data. Ritchie and Spencer (1994:186)	The data was further mapped using Excel and NVivo10 Framework Matrix. NVivo10 model’s functionality was used to develop models to explain the findings from the data. NVivo10 queries were used to test conclusions, whilst visualizations (such as charts and graphs) were also used to confirm and provide evidence for

Framework stage	Description of stage	Application in this research
	indicate that this stage focuses on “piecing together the overall picture and is not simply a question of aggregating parts, but of weighing up salience and dynamics of issues and searching for structure rather than a multiplicity of evidence”.	conclusions.

4.2.3 Data analysis techniques

The Framework approach provided a guideline for the procedure of data analysis. However, Framework did not elaborate on specific qualitative data analysis techniques that needed to be applied. Thus appropriate techniques were identified to complement Framework, originating mainly from Miles et al. (2014). These techniques are elaborated upon in Table 15, whilst Chapter 5 provides the actual application of the technique in this research.

Table 15. Qualitative Data Analysis (QDA) techniques used in this research (adapted from Miles et al. (2014))

QDA technique	Description of technique	Application in this research
Data analysis		
First- and second-cycle coding	First-cycle coding is a way of initially summarising data segments. Second-cycle coding groups these summaries into a smaller number of categories, themes or constructs. The interrelationships that emerge can be used to develop higher-level analytical meaning from the data.	The first-cycle coding method applied was largely “descriptive coding”, which assigns a label to the field data in order to summarise it in a word or short phrase. The first-cycle codes used were largely determined by the literature review. Additional codes were created for emerging findings from the field data that did not come up during the literature review. The first-cycle codes were further analysed and categorised into second-cycle (or pattern) codes. The types of second-cycle codes applied in this

		<p>research were mainly “Categories or Themes” and “Causes and Explanations”. The second-cycle codes were derived directly from the field data.</p> <p>As part of the analytical process, “narrative descriptions” were used to identify and elaborate on the pattern codes that emerged, interwoven with field data to support the explanations.</p> <p>“Matrix displays” were also used in the analysis process to summarise the data for reflection and in order to draw conclusions.</p>
Analytical memos	<p>An analytical memo is used to document the researcher’s thinking process and emerging analytical thoughts about the data. The analytical memo serves as a means to synthesise the data into higher-level meanings.</p>	<p>Analytical memos were used in this research as a “diary” that logged the changes and evolution of the research project over time. In addition, analytical memos were linked to the codes/nodes that emerged during the analysis to document and track the researcher’s thoughts about how they related back to the research questions. NVivo10 “Memos” functionality was used for this purpose.</p>
Data display		
Matrices	<p>A matrix is an intersection of two lists that are set up as rows and columns.</p>	<p>The main types of matrices used in this study were a Variable-by-Variable matrix and a Content Analytic Summary Table.</p> <p>The Variable-by-Variable matrix shows the interviewee views for each theme that emerged from the data. NVivo10 “Framework Matrix” functionality was used for this purpose, and it became the basis for initially developing the first-cycle codes into second-cycle codes. This type of matrix was also used to show the relationships that emerged between themes and sub-themes, and relationships between themes.</p> <p>The Content Analytic Summary Table groups together relevant and related data from multiple</p>

		interviewees or document sources into a single view for exploratory analysis.
Vignettes/ Narratives	<p>Vignettes are a description of portions of the fieldwork that have a narrative, story-like structure.</p> <p>Similarly, a Narrative is an elaboration on second-cycle coding, which is supported by extracts from the field data.</p>	<p>Vignettes/Narratives have been used to describe the findings and conclusions from the field data. The key findings are explained and supported with direct quotes or summaries of findings from the field data. Thus the researcher's analysis of the data and actual field data have been linked together to form a meaningful representation of the findings.</p>
Drawing and verifying conclusions		
Noting patterns and themes	<p>Patterns and themes refer to recurring similarities or differences between categories of data, which are constructed from observations of recurring phenomena.</p>	<p>Patterns and themes were applied during second-cycle coding to identify similarities and differences that existed in the field data. These patterns and themes were further summarised into a Content Analytic Summary Table to confirm findings and explain differences that may have existed, and were thereafter developed into a model representing findings from the field data.</p>
Counting	<p>Counting is applied in qualitative research to see at a high level what exists in a batch of data, to verify hypotheses or hunches and to provide evidence of analytical reasoning to protect against bias.</p>	<p>Counting was applied in this research largely based on the amount of total interview time that interviewees spent discussing particular topics. Counting provided evidence for why User Adoption is positioned as the central theme of the research and why Technology Infrastructure was deemed to be a less important challenge. Counting also provided a high-level view of the relative importance of a particular topic to a particular interviewee.</p> <p>In addition, counting provided an overview of the number of interviewees who agreed/disagreed with the views of a particular topic. This provided evidence for the analytical reasoning and for</p>

		<p>establishing a sense of the trends that emerged from the data.</p> <p>Thus, in this research counting served as a means to present the field data at a high level, as well as to show evidence of the analytical process and protect against bias.</p>
Subsuming particulars into the general	<p>This is a conceptual and theoretical activity that cycles between first-cycle coding and more general categories until the category is saturated, i.e. new data does not add more meaning to the general category.</p>	<p>The process of second-cycle coding as described above was applied in this research to subsume particular field data into more general categories. This was done using NVivo10 Framework Matrix functionality.</p> <p>In addition, the findings related to Technology Infrastructure were subsumed into general categories that emerged for User Adoption.</p>
Noting relationships	<p>This technique is used to discover what types of relationships, if any, exist between two or more variables.</p>	<p>This research focused on identifying relationships that existed between themes and sub-themes of the data. A Variable-by-Variable matrix was used to summarise and present the findings of the relationships, whilst Narratives explained these relationships further to provide a rich, contextual understanding of the findings.</p>
Check meaning of outliers	<p>This process is concerned with examining exceptions to findings, to test the generality of findings and to protect against self-selecting biases.</p>	<p>The outlying cases or views in this research were identified and further analysed and integrated into the overall findings.</p>

4.2.4 Use of Computer Aided Qualitative Data Analysis Software

NVivo10 was the CAQDAS used in this research. The previous sections in this chapter have described how NVivo10 was used in different parts of data analysis. This section provides further explanation of the significant role that NVivo10 played in the research, in accordance with the stages of the Framework approach described earlier.

4.2.4.1 Thematic framework

NVivo10 makes use of “nodes” to describe a collection of references to a particular theme, person or topic of interest. A node is produced by coding data, and nodes can be structured in various ways by the researcher (Bazeley and Richards, 2000). The initial thematic framework was captured in NVivo10 as a node hierarchy, influenced largely by the literature review. This thematic framework, however, evolved as the coding and analysis progressed.

The initial node hierarchy represented the initial thinking about the research questions informed by the literature review. During the process of data analysis, new nodes were created to cater for emerging concepts and themes from the field data that did not appear in the literature review. In addition, existing nodes were deleted, renamed, moved or merged as the field data began to take shape during the data analysis and became a more accurate reflection of the thinking about field data (Lewins and Silver, 2010). Bazeley and Richards (2000) describe the merging and moving of nodes as a necessity as the thinking about data develops, and to maintain clarity about the analysis.

A nodes list report is a snapshot in a moment of time showing the node structure before and after changes (Lewins and Silver, 2010). Figure 14 illustrates the initial node hierarchy, whilst Figure 15 illustrates the node hierarchy at the end of the research. The “before” report highlights that the node hierarchy was influenced mainly by the literature review with provision for emerging concepts and themes from field data. The “after” report highlights how the nodes were reorganised and synthesised, representing general findings from the field data.

<input type="radio"/>	Complexity
<input type="radio"/>	Communication
<input type="radio"/>	Compliance with legislation
<input type="radio"/>	Environmental complexity
<input type="radio"/>	G2G analysis complexity
<input type="radio"/>	G2G system security
<input type="radio"/>	Software engineering complexity
<input checked="" type="radio"/>	Software integration in G2G
<input type="radio"/>	Interoperability
<input type="radio"/>	Technical complexity
<input type="radio"/>	Conversion of existing platforms
<input type="radio"/>	Data quality
<input type="radio"/>	Not green field
<input type="radio"/>	Human Resources
<input type="radio"/>	Lack of training
<input type="radio"/>	Quantity of skills
<input type="radio"/>	Staff retention
<input type="radio"/>	Type of skills

<input type="radio"/>	ICT Infrastructure
<input type="radio"/>	Availability of technical infrastrucur
<input type="radio"/>	Government networks
<input type="radio"/>	Internet access
<input type="radio"/>	Telecommunications market
<input type="radio"/>	Telecommunications policy, legal an
<input type="radio"/>	User Adoption
<input type="radio"/>	Addressing user needs in the requir
<input type="radio"/>	Adoption depends on changing busi
<input type="radio"/>	Change management
<input type="radio"/>	Lack of user involvement and partici
<input type="radio"/>	Organisational culture

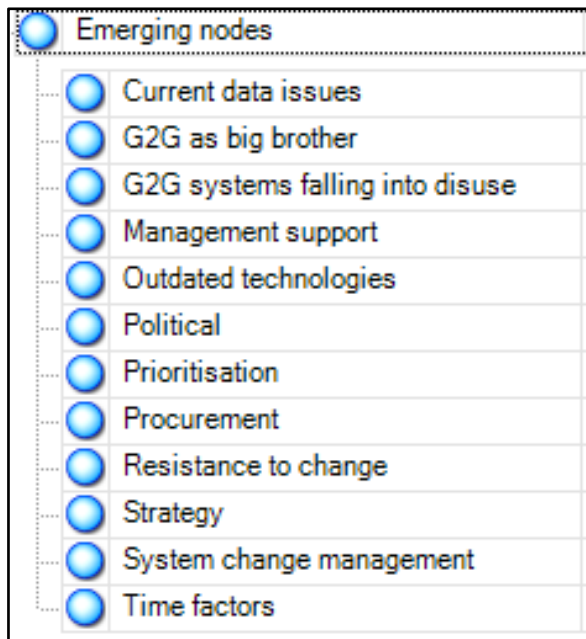


Figure 14. Original node hierarchy

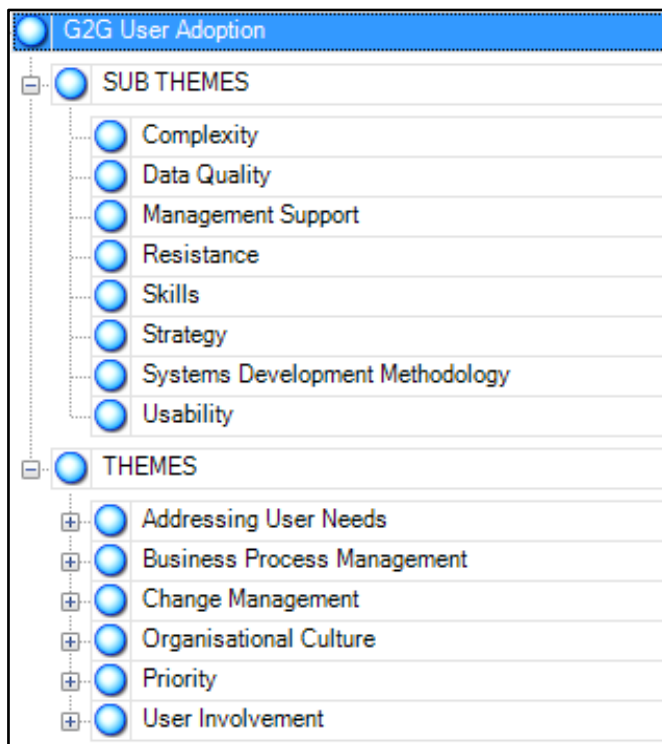


Figure 15. End-state node hierarchy

4.2.4.2 Indexing (Coding)

Audio recordings of interviews as well as transcribed interview data were imported into NVivo10. The coding, however, was performed only on the transcripts and not on audio. This coding is referred to as first-cycle coding and involves assigning labels with symbolic meaning to data chunks (Miles et al., 2014).

Figure 16 is an extract from Joe's interview transcript and shows coding stripes. The coding stripes provide a graphical view of the nodes at which the data chunks have been coded for a particular data source. An alternative view of the coded data can also be provided at the node level as shown in Figure 17. This is an extract from the *Addressing User Requirements* node and provides a view of all the data that has been coded at this particular node, across different data sources. The nodes were interrogated in more sophisticated ways using NVivo10 queries and reports to compare data and validate conclusions.

In order to maintain a history of the coding process, as well as to document the evolution of nodes and emerging constructs and relationships, NVivo10 memos were used. The memo is a text extract that can be linked directly to nodes or other elements in the NVivo10 project.

The developers need to be knowledgeable about the business processes. They need to know the business. It is not only about what will make life easier for the developer, seems like the system was designed to make troubleshooting easier for developers. Now we get people who are supposed to be helping us and sorting out problems on the system, but they do not know the system and screens themselves. Developers must be comfortable with the business so that they can provide support, and the users know that the inputs will be beneficial to us. There must also not be only one person, there needs to be a back up. We have had about 3 or 4 changes since the project started each time there is a change it sets us back. We need to teach the developers about the system.

The image shows a screenshot of a software application used for coding interview transcripts. On the left side, there is a text area containing a paragraph of text. On the right side, there is a list of codes or categories, each represented by a colored vertical bar. The codes are: 'ent' (black), 'ent' (black), 'ent' (black), 'Staff retention' (yellow), 'USER ADOPTION - Skills' (red), 'Business Process Management' (purple), and 'STRUCTURE' (black). The text area is currently empty, and the codes are listed vertically.

Figure 16. Extract from coded interview transcript

<Internals\Interviews\Transcripts\Ria - RV - Interview transcript> - § 5 references coded [12.76% Coverage]

Reference 1 - 4.26% Coverage

Its true that users needs are sometimes, or often times rather, not addressed in the requirements stage. Sometimes you find that the URS is correct but that there is misinterpretation from the developers and you then having users pushing against the system. Obviously because its not what they wanted in the first place. All development projects, if it doesn't meet the user needs 100% then they refuse to use the system. Sometimes they use this as an excuse, they have other reasons why they don't want the system in place. But this is a good excuse, they just say it does not work.

Reference 2 - 3.29% Coverage

Eliciting requirements at the outset is important but you find that it is always changing. User requirements specification is not all encompassing, and I am not

Figure 17. Extract from *Addressing User Requirements* node

4.2.4.3 Charting

Charting was conducted in two stages. Firstly, the first-cycle codes were drawn into a Framework Matrix in NVivo10. A Framework Matrix is a two-dimensional matrix that in this case is made up of the interviewee on the row and the nodes as the columns. An extract of the Framework Matrix is shown in Figure 18. NVivo10 Summary Links were used to document emerging constructs and themes that emerged during the development of the Framework Matrix. A Summary Link is a note with textual description that also links cells in the Framework Matrix directly to data from the source (e.g. interview transcripts).

In the second stage of charting, the Framework Matrix was exported into Microsoft Excel for further analysis in order to develop patterns. Miles et al. (2014:86) describe this as second-cycle coding with the aim of grouping first-cycle summaries “into a smaller number of categories, themes or constructs”. Each column of the Framework Matrix was extracted into a separate worksheet in Excel, and the data in each cell was analysed further to identify and code patterns. An example of the second stage charting in Excel is shown in Figure 19.

	A : Addressing User Needs	B : Business Process Management	C : Change Management	D : User Involvement	E : Organisational Culture
8 : Billy - BA...	<p>Instead of just focussing on the minimum to get things going, you find we want the Rolls Royce and things just don't go anywhere. The systems end up being too big, too complex. We should start small, you find then people understand the system and the system grows and people grow with the system. Sometimes though even the basics end up being too complex, and you never get the buy-in.</p>		<p>I tried to put in a person to look after this and drive it, to change the culture in the field. But those posts have not disappeared. You need to have the right person in the regions, who knows the system. You cannot drive the system implementation from Head Office. You find that the posts are not filled or filled by the wrong people. We need people in the regions, but the regions have other priorities. Systems are not priorities. Buy in needs to be driven from the GM level.</p>	<p>Pat usually involves everything himself but we have started trying to get the users involved. But usually its just the closest region, not all regions are involved. An example is that it was decided we will use ATE's and assist them to register, and place them in our regional offices and cost centers. We need to equip them, give them a computer, give them Civil Designer so that they can do their design work and give them an A0 plotter. This was supposedly agreed on by the HOD, CFO and SGM of Operations. Now we implementing this and putting the stuff out in the field. We've had Civil Designer out in the field for six months and not a single person has used it, not one single person. So even though the</p>	<p>Lets look at the A6 as an example. You find that Pat understands and Peter Summers. Peter is doing training in the cost centers and in the regions. Even after the training, still they have no clue what to do and there is reluctance to use it. You send them an A6 and you get it back exactly the same, unchanged.</p> <p>People are not interested in reporting whatsoever, there is not a thing done. It's the culture, the reporting is not important. Nobody is driving it to see that they are doing what they need to do, even the GM's do not see</p>
9 : Gerrie - ...	<p>Addressing user needs is directly related to user involvement. If needs are met adoption rates are high, there is a close correlation. More knowledgeable and skilled staff are involved in user requirements, more relevant the user needs actually has. Skilled users want particular functions as it meets their specific needs. Sometimes though you find the more skilled the user, the complex the system becomes.</p>	<p>A G2G system affects business processes quite a lot. Its about moving from manual to computerised and established procedures need to be changed. E.g. Standard filing systems in a registry and how to draw files and write correspondence - this goes out the window when replaced by e-mails, a database or</p>	<p>A G2G system affects business processes quite a lot. Its about moving from manual to computerised and established procedures need to be changed. E.g. Standard filing systems in a registry and how to draw files and write correspondence - this goes out the window when replaced by e-mails, a database or even an ECM system. People need to get an idea of how processes are to be changed, and this is</p>	<p>User involvement plays a key role and is of critical importance because usually these systems are of a specialist nature. Government departments capture specific data that only applies to a small part of the line function. E.g. Human Settlements Project Tracking System - not everyone made use of it, knowledgeable staff must be involved and they need to provide their requirements. And not just</p>	<p>Organisational culture sits on the periphery. It affects how disciplined the users are when it comes to system use. If it is a service type of culture you find the users are more disciplined but if it is a political culture, as most departments are these days, then user discipline is low. This will then link to the use of the system, and extrapolate</p>

Figure 18. Extract from User Adoption Framework matrix

1	Addressing user needs - Key challenges from interviewees perspective		Themes identified
3	Billy - BA - Interview transcript	<p>1. Complex requirements - "Instead of just focussing on the minimum to get things going, you find we want the Rolls Royce and things just don't go anywhere. The systems end up being too big, too complex."</p> <p>2. Evolutionary system development - "We should start small, you find then people understand the system and the system grows and people grow with the system."</p> <p>3. Lack of support "Sometimes though even the basics end up being too complex, and you never get the buy-in."</p>	<p>1. Complexity (user requirements)</p> <p>2. System development methodologies;</p> <p>3. Resistance</p>

Figure 19. Extract from *Addressing User Needs* second-cycle coding

4.2.4.4 Mapping and interpreting

Microsoft Excel and NVivo10 were used in the mapping and interpreting stage of data analysis. The second-cycle nodes were structured into summary matrices in Excel, and NVivo10 queries were used to interrogate data, and test and confirm the accuracy of structures in the Excel summary matrices. The various matrices and NVivo10 queries are described in Chapter 5.

The findings from the data, once tested and confirmed, were constructed into models in NVivo10. The NVivo10 model functionality allows for the development of models directly from the NVivo10 project items. For instance, nodes can be inserted directly in the model, where nodes represent code data chunks from the field data. Thus, the models are rooted in the field data. These models are described in Chapter 5.

CHAPTER 5

DATA ANALYSIS

This chapter begins with an overview of the field data findings. The positioning of User Adoption as the central challenge facing G2G is thereafter elaborated upon. Six main themes and eight sub-themes are then highlighted as challenges related to User Adoption that also present challenges to G2G. Each of the six main themes is discussed in detail, together with the related sub-themes. Finally, Technology Infrastructure is discussed as a challenge. The chapter concludes with a summary of the field data findings.

5.1 INTRODUCTION

The research question aimed to understand how the identified challenges affect G2G in the KZN DoT. The G2G challenges that were identified and hence formed the scope of this study were (1) User Adoption, (2) HR Skills, (3) Complexity and (4) Technology Infrastructure.

Of these identified challenges, G2G User Adoption has emerged as a central theme from the field data, which comprises six main themes and eight sub-themes. HR Skills and Complexity (originally part of the research question) have emerged as sub-themes related to G2G User Adoption, whilst Technology Infrastructure (originally part of the research question) has not been seen as an important G2G challenge in its own right. The underlying issues related to Technology Infrastructure do, however, provide support for the G2G User Adoption sub-themes.

Themes were determined to be important if a majority of interviewees highlighted the themes as challenges facing G2G. Sub-themes were seen as important if the number of interviewees supporting them as challenges exceeded the number of interviewees who did not support them as a challenge. The findings are summarised in Figure 20. The remainder of this chapter discusses each of the findings in detail together with the field data support for the findings.

RESEARCH QUESTION	FIELD DATA FINDINGS	
User Adoption	6 Main themes identified	8 sub themes identified
HR Skills		Subsumed as sub theme of User Adoption
Complexity		Subsumed as sub theme of User Adoption
Technology Infrastructure	Has not emerged as an important challenge in itself. However underlying issues support User Adoption sub - themes.	

Figure 20. Summary mapping of research question to field data findings

5.1.1 Positioning Government-to-Government User Adoption as the central theme of Government-to-Government challenges

In the context of this study, the concept of User Adoption refers to the end user in the Department transacting on a G2G system to execute a business process. The literature review has expanded on the concept of User Adoption and identified five main themes as G2G User Adoption challenges: *Addressing User Requirements*, *Business Process Management*, *Change Management*, *User Involvement* and *Organisational Culture*. These five main themes formed the basis of the questions related to the challenge of User Adoption in the research instrument.

The field data has confirmed that all five of the main User Adoption themes that emerged in the literature review do affect G2G in the KZN DoT; in addition, one more User Adoption theme (*Priority*) has emerged from the field data. Thus there are six main themes related to G2G User Adoption that have emerged from the field data. Therefore, the concept of User Adoption in this study is inclusive of these six main themes as well.

The field data has also shown that under the six User Adoption main themes there are a number of sub-themes that explain the G2G challenges in the KZN DoT. These sub-themes include the original research questions related to HR Skills and Complexity. Thus the *field data* has positioned User Adoption as a central theme (i.e. the central challenge of G2G), under which the other research questions related to HR Skills and Complexity have emerged. In order to provide evidence of the positioning of User Adoption as the central theme and to illustrate the trend that emerged from the field data, graphical representations of the percentage of field data highlighting HR Skills and Complexity as sub-themes of User Adoption are shown in Figure 21 and Figure 22. These graphs show the amount of interview time that was spent by interviewees describing User Adoption being affected by HR Skills and Complexity. For instance, Donna spent approximately 23% of the interview describing how User Adoption is affected by Complexity (Figure 21) whilst Bernice spent approximately 28% of her interview describing how User Adoption is affected by HR Skills (Figure 22).

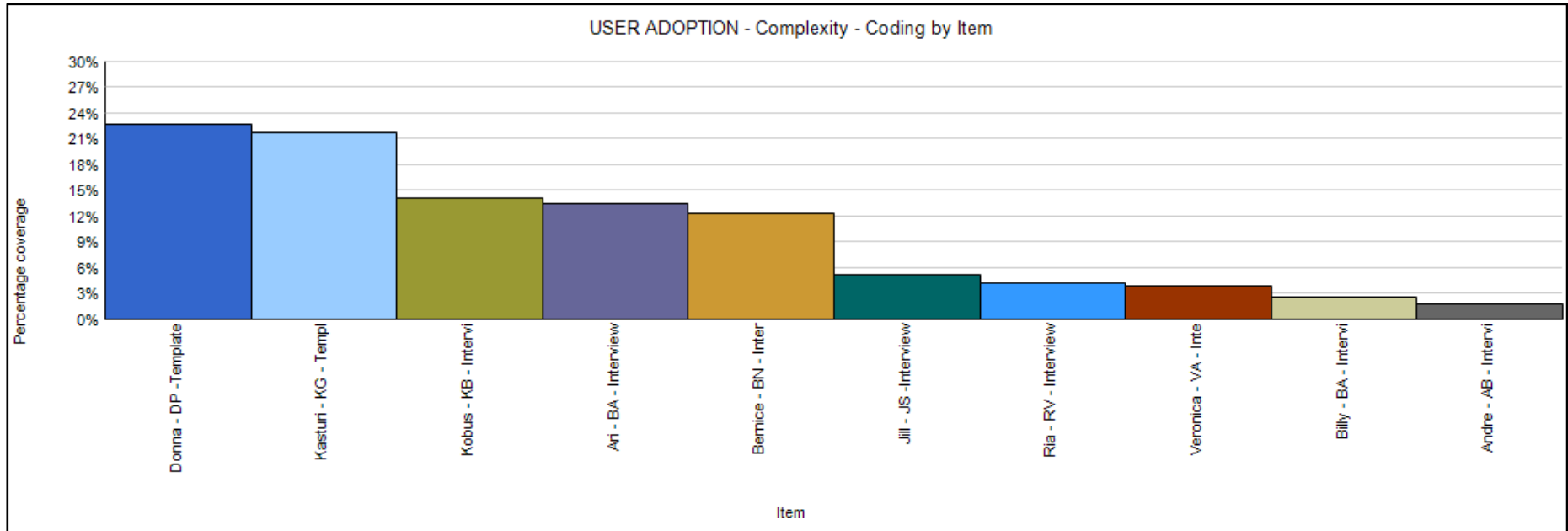


Figure 21. Percentage coverage of interviews with User Adoption affected by Complexity

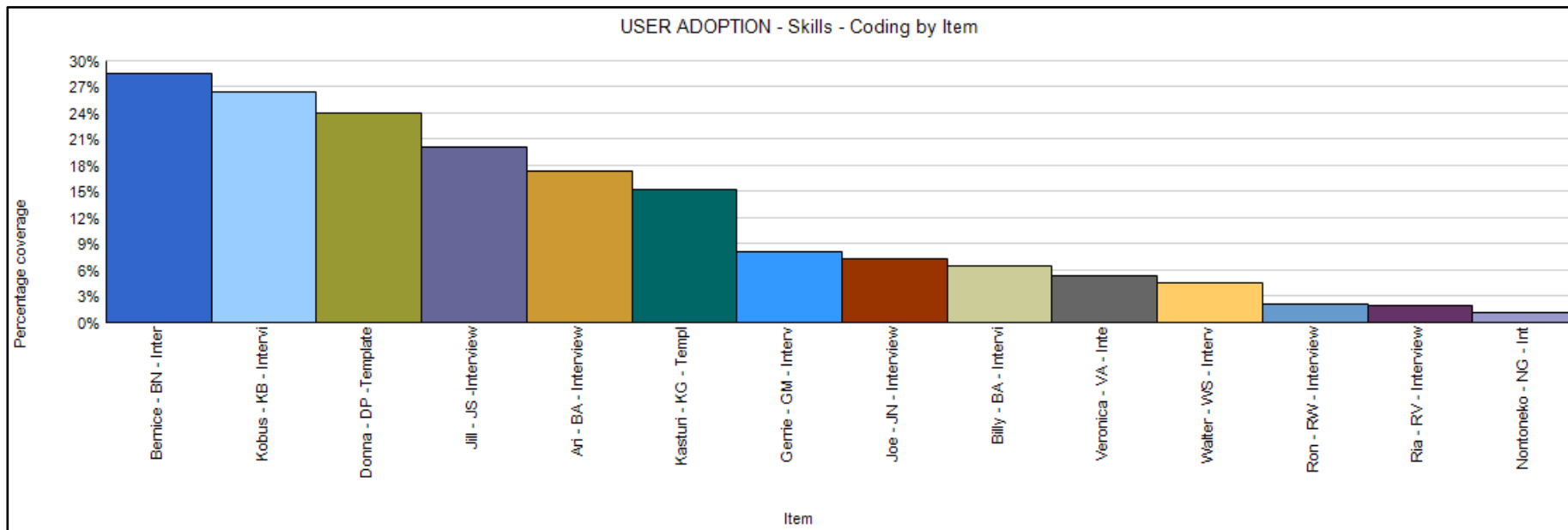


Figure 22. Percentage coverage of interviews with User Adoption affected by Human Resources Skills

One specific example from the field data positioning HR Skills as a sub-theme of User Adoption is seen in the KZN DoT IT Systems Position Paper (KZN DoT, 2013b). The skills needed to implement and support G2G are described as being a prerequisite for the adoption of G2G. The document goes so far as to say that any G2G implementation should only be done once the HR Skills requirements have been addressed and that “the premise is that without the requisite resourcing, a system will not deliver on its intended objectives and realise value” (KZN DoT, 2013b: 40).

There are also examples from field data where interviewees have clearly confirmed that G2G User Adoption “*is the most critical part of a successful G2G system. If the users do not use the system, there is no value*” (Andre). There have been similar views expressed relating to the G2G User Adoption main themes. For instance, Gerrie describes *User Involvement* (sub-theme of User Adoption) as “*playing a key role and is of critical importance*”. At the same time Donna believes that *Change Management* (sub-theme of User Adoption) is “*the most important thing*” and Kasturi describes the risks and challenges to G2G when “*change is forced from top-down without actually informing all the levels within the organisation*”. Another example is where Billy and Jill both mention *Priority* (sub-theme of User Adoption) of G2G by management as one of the biggest challenges facing G2G.

A graphical representation of the field data identifying G2G User Adoption, or one of the G2G User Adoption main themes, as the central challenge of G2G is shown in Figure 23. This graph is based on actual evidence from the field data, as shown in the sample quotes above. 13% of interviewees (two out of 15) agreed that User Adoption is the most important challenge facing G2G, whilst 54% of interviewees (eight out of 15) agreed that one of the User Adoption main themes is the most important challenge facing G2G. 33% of interviewees (five out of 15) did not provide a clear response on whether User Adoption or one of the User Adoption main themes is the most important challenge facing G2G. None of the interviewees disagreed that User Adoption is the central challenge facing G2G. Thus, the positioning of User Adoption as the central challenge facing G2G is based on the majority of interviewees (10 out of 15) mentioning G2G User Adoption or one of the User Adoption main themes as the most important challenge facing G2G.

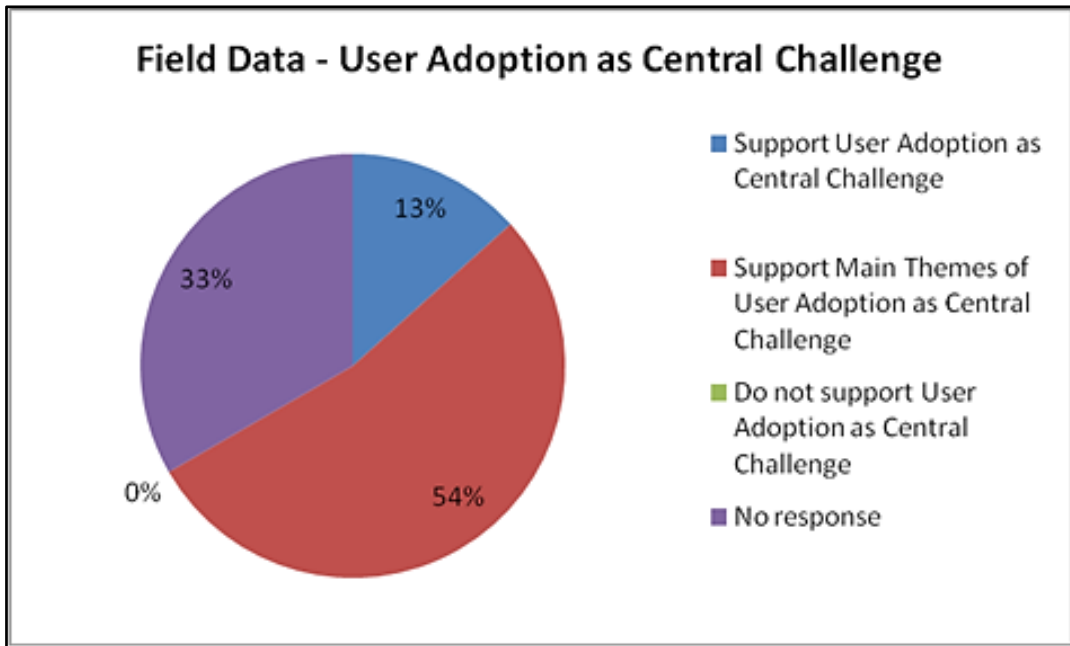


Figure 23. Field data evidence supporting User Adoption as the central challenge of Government-to-Government

5.1.2 Summarising Government-to-Government User Adoption as the central theme, main themes and sub-themes

A summary diagram showing G2G User Adoption as the central theme, and mapping the main themes and sub-themes related to G2G User Adoption, is shown in Figure 24. These main themes are based on the majority of interviewees mentioning these as challenges facing G2G. The sub-themes are based on whether the number of interviewees supporting them as challenges exceeded the number of interviewees who did not support them as a challenge. The field data evidence is discussed in the remainder of this chapter.

		G2G User Adoption Sub Themes							
		Strategy	Usability	Complexity ¹	Resistance	System development methodologies	Management Support	HR Skills ¹	Data Quality
G2G User Adoption Main Themes	Addressing User Requirements	x		x	x	x		x	
	Business Process Management		x	x		x	x	x	x
	Change Management					x	x	x	x
	User Involvement				x	x	x	x	x
	Org Culture				x	x	x	x	x
	Priority ²	x					x		

NOTES:

1. G2G challenge as per original research question, which has emerged from field data as a sub theme of user adoption
2. New main theme related to user adoption which has emerged from field data

Figure 24. Government-to-Government User Adoption — Mapping of main themes and sub-themes

The field data has also shown that there are relationships that exist between the main themes as well, which are shown in Figure 25.

Impacts on	Addressing User Requirements	Business process management	Change Management	User involvement	Org Culture	Priority
Addressing User Requirements		x		x		
Business Process Management			x			
Change Management		x		x		
User Involvement		x	x			
Org Culture						
Priority						

Figure 25. Government-to-Government User Adoption — Mapping of relationships between main themes

5.1.3 Structure of this chapter

The following sections in this chapter are structured in accordance with Figure 24, addressing each of the six main themes related to G2G User Adoption.

For each main theme an overview of the findings is presented, including relationships, influences and high-level views of the interviewees' perspectives. This is followed by a more detailed presentation and discussion of the field data for each of the main themes, through the use of narratives.

5.1.3.1 Structure of “overview” section

In presenting an overview of relationships and influences a scatter graph is used to show at a glance how, from the field data, each of the six themes under discussion relates to other themes and sub-themes. See for example Figure 26 which presents the theme “Addressing User Requirements”. The scatter graph shows firstly the “Overall impact on G2G” that “Addressing User Requirements” has on User Adoption (highlighted in red on Figure 26 for ease of reference); of which it can be seen that 11 interviewees supported the existence of an influence or relationship between “Addressing User Requirements” and overall impact on User Adoption of G2G, whilst 2 interviewees did not support such an influence or relationship and the remaining 2 interviewees provided no response at all for such an influence or relationship. The reasons for not supporting a relationship or influence are discussed as part of the overview section in the chapter, whilst the remainder of the section explores and explains the influences or relationships that did emerge from the field data.

The rest of the scatter graph shows the number of interviewees who provided responses on the existence of relationships or influences between the main theme of “Addressing User Requirements” and the other themes or sub-themes. See for example the blue highlights on Figure 26, which indicates that 3 interviewees provided a response on how “Resistance” influences or relates to User Adoption whilst 12 interviewees did not provide any response on such a relationship or influence. It must be noted that the lack of response does not necessarily indicate that there is a lack of knowledge on the part of the interviewees, but rather indicates that the interviewee did not discuss any influence or relationship between the main theme under discussion and this particular theme or sub-theme. The interviewee may in fact have chosen to rather discuss influences or relationships between the main theme under discussion and some other theme e.g. instead of a relationship between “Addressing User Requirements” and “Resistance”, an interviewee may have instead discussed a relationship or influence between “Addressing User Requirements” and “Skills”. This field data, where interviewees provided support for relationships

and influences, is then discussed in further detail in the narratives that follow for each theme under discussion.

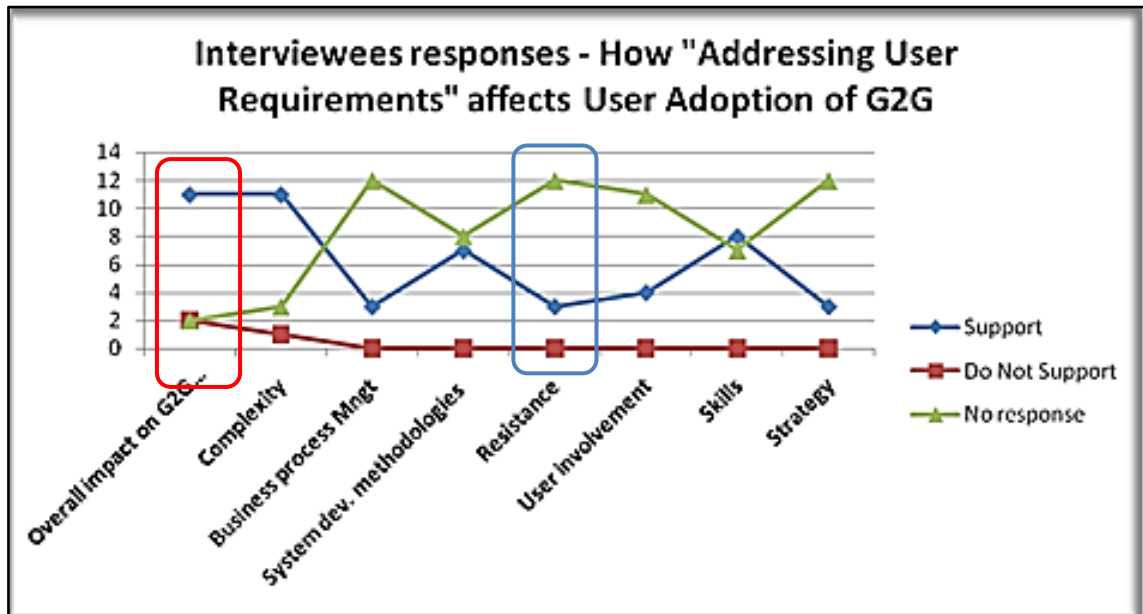


Figure 26. High-level view of interviewee responses — How *Addressing User Requirements* affects Government-to-Government User Adoption (figure repeated for ease of reference)

After presenting the scatter graph in the overview section of each theme under discussion, another simplified graph is used as shown in Figure 27. This graph is similar to the scatter graph shown in Figure 26 however it simply shows the main theme under discussion (grey horizontal block), and each of the related themes and sub-themes are then shown as vertical blocks. The white vertical blocks indicate other main themes which relate to or influence the main theme under discussion; whilst the remaining coloured vertical blocks indicate sub-themes which relate to or influence the main theme under discussion. The colour-coding applied in this graph is consistent with the colour-coding applied elsewhere in the document for sake of consistency. This simplified graph is used as an organising logic for the narratives and detailed discussion which then follows for each of the themes under discussion.

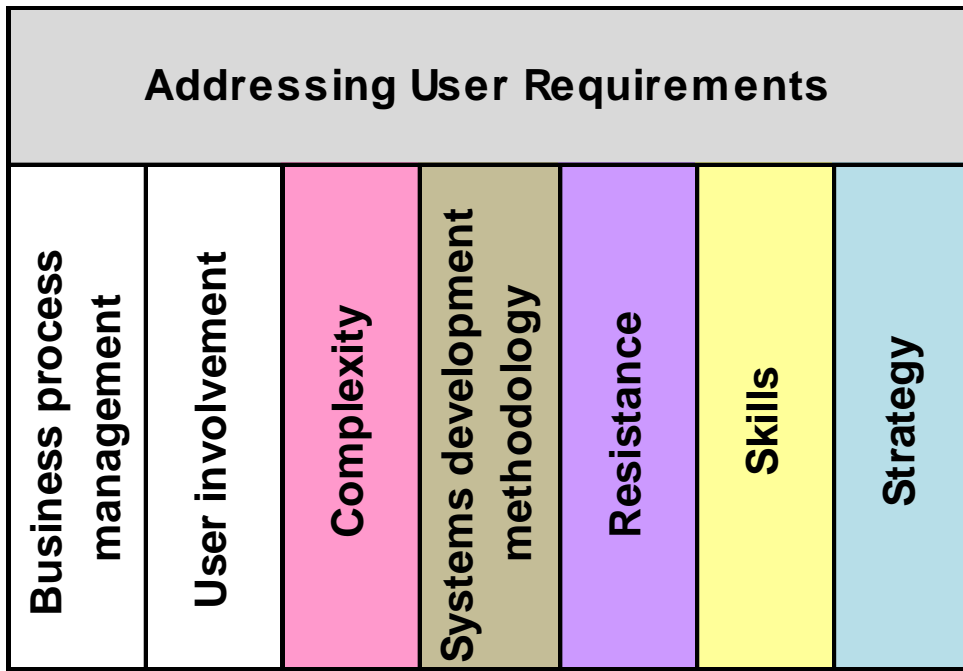


Figure 27. Themes and sub-themes related to *Addressing User Requirements* (figure repeated for ease of reference)

5.1.3.1 Structure of “high level view of interviewees perspectives” section

Before commencing with a detailed discussion and narratives on each of the themes, a high level view of the interviewee’s perspectives is shown. This view summarises the evidence that exists in the field data to support the theme under discussion. This is done through two Nvivo10 analysis tools.

A coding summary is shown firstly as illustrated in Figure 28, which summarises the number of references that the source (either a document or an interviewee) made to the theme (see “References” column), whilst the “Coverage” column shows the percentage of the entire source that made reference to the theme.

The “Coverage” is also shown in Figure 29 where the percentage of the entire source that made reference to the theme under discussion, is shown in the form of a bar graph. Figure 29 illustrates for example that 52% of Donna’s interview yielded data relating to the main theme of *Addressing User Requirements*.

These two Nvivo10 analysis tools are not presented to make any assertions about the importance or significance of a theme under discussion in relation to the other G2G User Adoption themes or sub-themes. The main reason why these tools are used is to present an overview of the evidence that exists in the field data supporting themes being discussed. These analysis tools do, however,

show the importance or significance of a particular theme being discussed from the perspective of that particular interviewee at the time of the interview, since it shows the amount of time that the interview spent discussing the theme.

Name	In Folder	References	Coverage
Donna - DP - Template 2	Internals\Interviews\Transcripts	10	51.71%
Kasturi - KG - Template 2	Internals\Interviews\Transcripts	9	41.58%
Kobus - KB - Interview Template 2	Internals\Interviews\Transcripts	9	41.35%
Veronica - VA - Interview transcript	Internals\Interviews\Transcripts	9	30.38%
Jill - JS - Interview Template 2	Internals\Interviews\Transcripts	7	20.74%
Joe - JN - Interview transcript	Internals\Interviews\Transcripts	6	18.41%
Position paper - IT Systems in KZN DoT	Internals\Document analysis\KZN DoT documents	17	18.20%
Bernice - BN - Interview Template 2	Internals\Interviews\Transcripts	2	16.94%
Ari - BA - Interview Template 2	Internals\Interviews\Transcripts	5	14.30%
Ria - RV - Interview transcript	Internals\Interviews\Transcripts	5	12.76%
Billy - BA - Interview transcript	Internals\Interviews\Transcripts	4	11.89%
Nontoneko - NG - Interview transcript	Internals\Interviews\Transcripts	4	11.02%
Gerrie - GM - Interview transcript	Internals\Interviews\Transcripts	3	8.75%
Ron - RW - Interview transcript	Internals\Interviews\Transcripts	2	8.51%
Andre - AB - Interview transcript	Internals\Interviews\Transcripts	3	7.68%
Walter - WS - Interview transcript	Internals\Interviews\Transcripts	2	3.87%
Enterprise Architecture Project - RFP	Internals\Document analysis\KZN DoT documents	3	0.29%
Business Solutions SLA - RFP	Internals\Document analysis\KZN DoT documents	1	0.03%

Figure 28. Field data coding summary — Addressing User Requirements (figure repeated for ease of reference)

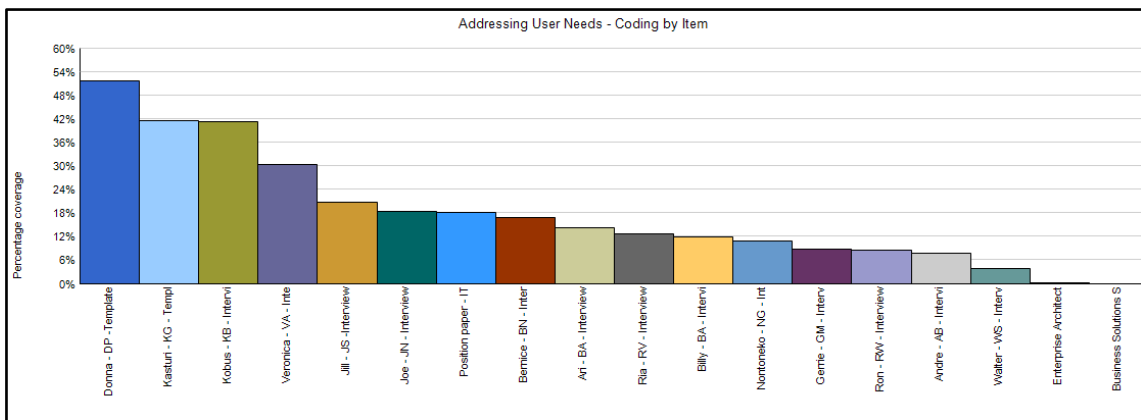


Figure 29. Field data coding chart — Addressing User Requirements (figure repeated for ease of reference)

5.1.3.1 Structure of “narratives” section

Having provided an overview in the form of relationships, influences and high-level views of the interviewees’ perspectives, narratives are then used to provide insight into the field data findings, emphasising the relationships that emerged between each theme and related sub-themes. As discussed earlier, the simplified graph of relationships between theme under discussion and other

themes or sub-themes (see for example Figure 27) is used as the organising logic for the narratives and detailed discussion. The field data and analysis related to HR Skills and Complexity will be discussed under the main themes to which they map as presented in Figure 24. In addition, the field data and analysis related to the Technology Infrastructure research question will be presented separately as there were unique findings regarding Technology Infrastructure.

The chapter concludes with a summary of the findings from the field data.

5.2 GOVERNMENT-TO-GOVERNMENT USER ADOPTION — ADDRESSING USER REQUIREMENTS

5.2.1 Overview

Interviewees shared the view that one of the reasons why the adoption of G2G is a challenge in the KZN DoT is because user requirements are not addressed when G2G systems are implemented. According to Nontobeko, *“It is critical to address the user’s needs in the requirement specification; you cannot do something that the users do not agree with. Users will just not use the system.”* Similarly, Gerrie put this viewpoint across very clearly: *“If needs are met, adoption rates are high, there is a very close correlation.”*

5.2.1.1 Overall impact: Relationships and influences

A view of the overall impact that *Addressing User Requirements* has on User Adoption of G2G is shown in Figure 26, which is a summary graph showing whether interviewees supported, did not support or did not respond to *Addressing User Requirements* and the impact it has on User Adoption of G2G. Thus this graph is used to provide evidence for the analytical reasoning and for establishing a sense of the trends that emerged from the data (Miles et al., 2014). It can be seen from Figure 26 that 11 out of 15 interviews provided evidence supporting *Addressing User Requirements* influencing User Adoption of G2G, i.e. if user needs are addressed then adoption of G2G is likely to be higher.

There were two interviewees who provided contrary evidence and did not believe that *Addressing User Requirements* will improve User Adoption of G2G, whilst the other two interviewees did not provide a clear response. The reasons for the contrary views are that these interviewees believed that in some cases users themselves are not sure of their requirements, hence their needs can never be adequately addressed, or that it is difficult to identify the users of G2G whose needs must be

addressed. Thus the interviewees believe *Addressing User Requirements* will not necessarily improve User Adoption of G2G.

Figure 26 also shows the existence of field data evidence for the relationships between *Addressing User Requirements* and the emergent themes and sub-themes. Two main User Adoption themes (*Business Process Management* and *User Involvement*) and five sub-themes (*complexity, systems development methodology, resistance, HR skills* and *strategy*) have emanated from the field data. The identified themes and sub-themes are summarised in Figure 27. Each of these themes and sub-themes is discussed in relation to *Addressing User Requirements* in section 5.2.3, with field data evidence for the relationships also being presented.

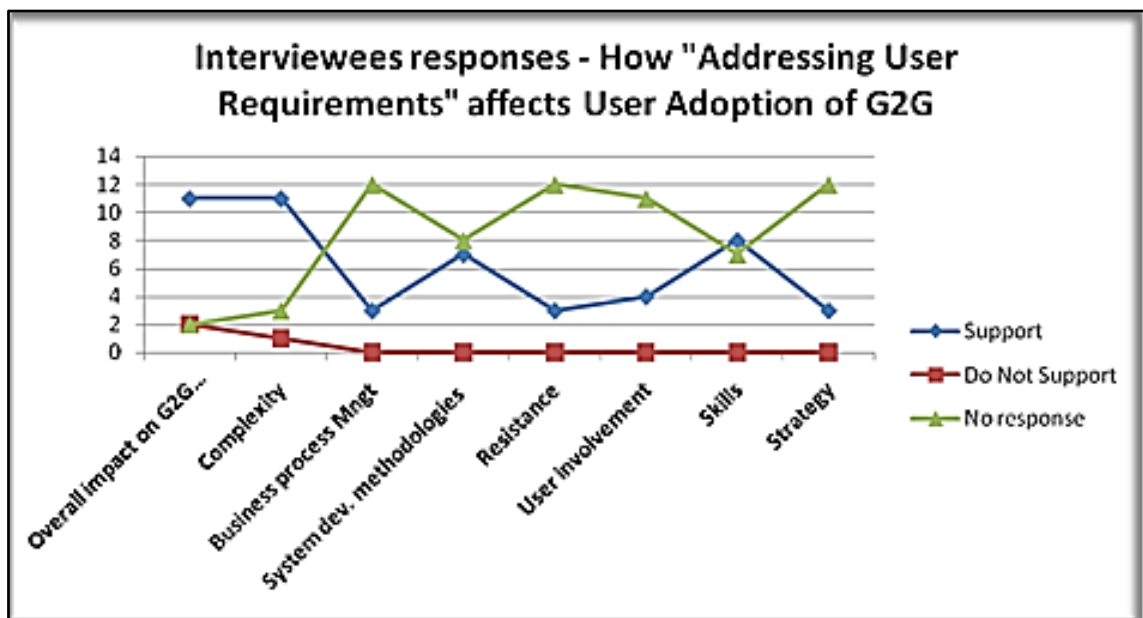


Figure 26. High-level view of interviewee responses — How *Addressing User Requirements* affects Government-to-Government User Adoption

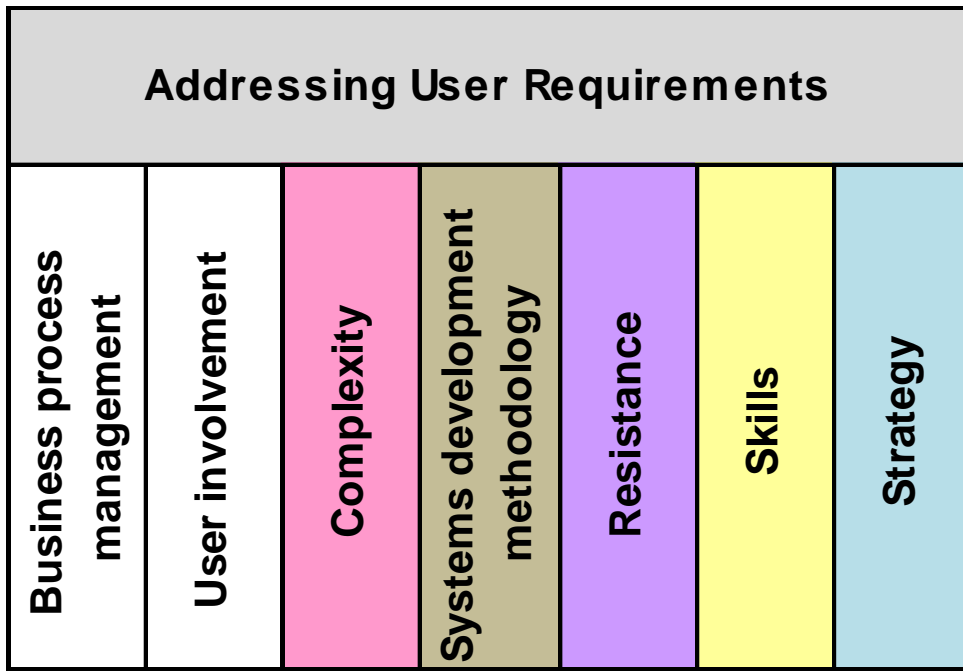


Figure 27. Themes and sub-themes related to *Addressing User Requirements*

5.2.2 High-level view of interviewees' perspectives

Figure 28 presents the coding summary for *Addressing User Requirements* as evident in interview data and document analysis. The “References” column shows the number of references that the source made to *Addressing User Requirements*, whilst the “Coverage” column shows the percentage of the entire source that made reference to *Addressing User Requirements*.

The “Coverage” is also shown graphically in Figure 29, illustrating for instance that 52% of Donna’s interview yielded data relating to *Addressing User Requirements*.

Figure 28 and Figure 29 are not presented to make any assertions about the importance or significance of *Addressing User Requirements* in relation to the other G2G User Adoption themes or sub-themes. Rather, they are presented to show where the evidence exists in the field data to support *Addressing User Requirements* as a theme of G2G User Adoption. The field data itself is discussed in detail in section 5.2.3 and summarised in section 5.2.4.

Figure 28 and Figure 29 do, however, show the importance or significance of *Addressing User Requirements* from the perspective of that particular interviewee at the time of the interview, since it shows the amount of time that the interview spent discussing the theme. It can therefore be seen that Donna, Kasturi and Kobus were the top three interviewees for whom *Addressing User Requirements* was the most important challenge facing User Adoption of G2G.

Name	In Folder	References	Coverage
Donna - DP - Template 2	Internals\Interviews\Transcripts	10	51.71%
Kasturi - KG - Template 2	Internals\Interviews\Transcripts	9	41.58%
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Enterprise Architecture Project - RFP	Internals\Document analysis\KZN DoT documents	3	0.29%
Business Solutions SLA - RFP	Internals\Document analysis\KZN DoT documents	1	0.03%

Figure 28. Field data coding summary — *Addressing User Requirements*

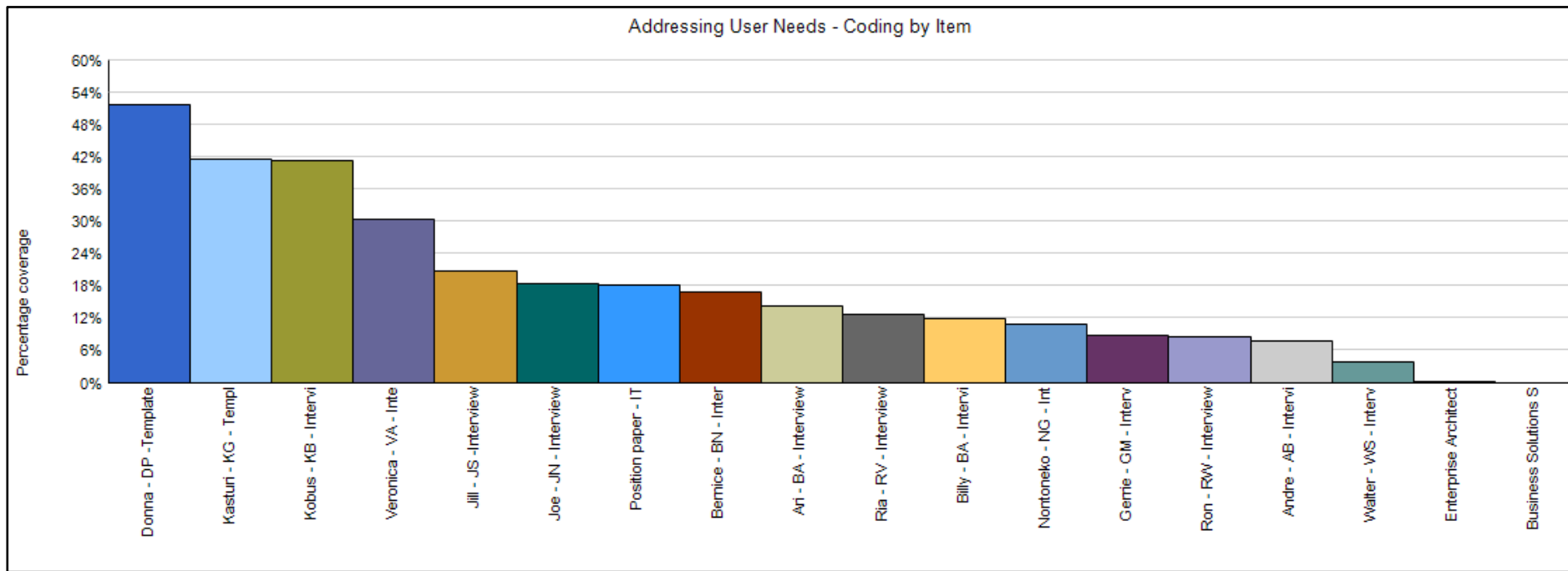


Figure 29. Field data coding chart — *Addressing User Requirements*

5.2.3 Narratives from field data — *Addressing User Requirements*

5.2.3.1 *Complexity as a sub-theme*

It has emerged that addressing user needs is not straightforward. There is complexity in understanding what the actual user requirements are. As Andre mentioned, *“It’s complex to analyse the requirements for systems partially because the people giving the requirements don’t know what they want in the first place. And that’s because they don’t know their own business.”* Billy went further, saying that even when users do articulate their requirements, the requirements sometimes end up being too complex and hence the user needs are not met. He indicated that, *“Instead of just focusing on the minimum to get things going, you find we want the Rolls Royce and things just don’t go anywhere. The systems end up being too big, too complex.”* Even if the user requirements are correctly analysed and documented, there may still be room for error as developers could misinterpret complex requirements, as mentioned by Ria. She elaborated that this results in an inaccurate system, which does not address user needs and is hence not adopted by users.

Addressing user requirements becomes complex in the KZN DoT because some of the G2G systems that must be implemented are replacements of existing systems. However, as described in the KZN DoT Position Paper on IT systems (KZN DoT, 2013b), these existing systems are sometimes old and outdated, with very little documentation available on how the system works. Thus, being able to define requirements for the new G2G system is difficult, as there is little information available on the workings of the existing system. Kobus indicated that added to this is the issue of lack of skills, as knowledgeable staff who worked on the systems may have left the Department, leaving a void in terms of expertise to explain what the user requirements should be. He stated that *“there is poor handover or takeover. Sometimes there is nobody to take over, or they are not provided with adequate transfer of material.”*

There are also environmental complexities that make addressing user needs difficult. For instance, as Kasturi and Jill mention, there are multiple government stakeholders involved, each of whom may have different requirements and priorities for the G2G system. Kasturi described the difference in requirements from national government, provincial government and municipalities, and stated that *“the challenge comes in because the way we are operating in government is not an integrated approach. You have policy makers that don’t engage with the levels of government below them, and when it comes time to implement and put in systems there is confusion about how to do it — what should be included, what should not be included”*. Bernice described complexities emanating from her experience in implementing a G2G system that involved national and

provincial government. She explained that they met first with national government to understand the requirements, and later consulted with provincial government. Even though *“the needs of the Province is different to National, the way National sees it is what they say goes. The provinces will moan and bicker but they do what they are told, or they just bypass the system and do it manually”*.

Environmental complexities are also seen in cases where the KZN DoT wants to implement a G2G system, but there is a possibility that a similar system will be introduced by another related governmental body. The strategy for such G2G systems that will be used across government is not clear, and the KZN DoT has difficulty in co-ordinating interactions between the different government bodies and obtaining firm decisions and commitments in terms of who will take accountability for the development and implementation of the G2G system. This issue was described by Ari, Kasturi and Jill. The interviewees mentioned that a key factor is time; even if another governmental body accepts the accountability for the implementation of the G2G system, the KZN DoT does not have much influence over how long that implementation will take. Ari and Kasturi described the Accident Management System as an example that could possibly be introduced by either the RTMC or the national DoT. Kasturi mentioned that a similar system is also being implemented by eThekweni Metro and the Human Sciences Research Council (HSRC). The KZN DoT is awaiting feedback and commitment from these government bodies and has hence not progressed with implementing its own Accident Management System.

Finally, addressing user requirements is also complex due to the fact that some of the Departmental operations, and related system functions, are outsourced. Examples described in the KZN DoT Position Paper on IT systems (KZN DoT, 2013b) include the Traffic Counts System, where a service provider does the actual traffic counting, gathers data and submits it to the Department in a standard format for uploading onto the system. The Position Paper (KZN DoT, 2013b) also mentions instances where service providers use their own systems and provide the Department with the outputs and reports from the system. Thus, outsourcing of business and/or system functions makes addressing user needs more complex, as the service providers will now also become users of the G2G system. The system will therefore need to cater for the needs of an even wider user base, with the user base possibly changing when service providers change. Ari described another challenge related to the outsourcing of system functions to service providers. He indicated that *“they do it as per the private sector and then only look at the Department’s requirements. All sorts of complexity then comes in”*. He explained that government solutions are not the same as private-sector solutions, and that service providers need to improve the chances of solutions being developed according to the constraints that government faces: *“It should all work together.”*

5.2.3.2 Resistance as a sub-theme

The interviewees indicated that users of G2G systems sometimes resist using the system, even if their needs are addressed by the system. Billy indicated that one reason why this happens is that the systems are just too complex and “*you never get the buy-in*”. This highlights the fact that it is not only important for the system to meet the needs of the users, but the manner in which their needs are met by the system should also be acceptable to the users. In one instance mentioned by Joe, there were a number of different capture screens that users had to fill out before the transaction could actually be completed on the system. This was time-consuming and frustrated the users, resulting in them resisting using the system. Kasturi indicated that “*people have become so used to working in their own little environment*”, and that they have smaller systems that cater for their needs. Therefore, there is a reluctance to use a single, integrated system that will cater for the needs of the Department as a whole. This is because users are pushed out of their comfort zone, and the new system may not be able to cater for their needs in exactly the same way that the old system did.

Ria mentioned cases where users intentionally sabotage the system. She said, “*They have other reasons why they don’t want the system in place. But this is a good excuse, they just say it does not work.*” One of the “other reasons” suggested is that the system will make work processes and bottlenecks more transparent, and reduce the possibility of corrupt behaviour. Therefore, even when the G2G system addresses the user needs in terms of the required functionality, the user may look for reasons not to use the system and go so far as to exaggerate system issues.

5.2.3.3 Human resources skills as a sub-theme

There was consensus amongst interviewees that the appropriate skills are required from the user base in order for them to articulate what their business needs are from the G2G system. Similarly, the technical staff, such as business analysts who are involved in documenting and modelling the business requirements, must also be appropriately skilled. However, 10 out of the 15 interviewees confirmed that the user and technical skills required for G2G are inadequate; Donna indicated that “*there are pockets of excellence, and in some areas it is just a no-go zone*”.

Gerrie elaborated that the skill sets that users should possess should involve deep skills in their own line functions and not necessarily ICT skills. This is so that the user can completely and accurately explain what the G2G system should do and how it should do it in terms of their business needs. Billy, however, mentioned that such skills are highly lacking in government departments. He indicated, for example, that the user requirements of G2G systems should be driven by legislation: “*But nobody is taking the time to understand the legislation nowadays. But*

that governs how we operate, if we don't understand the Acts then the system implementation becomes difficult. People from the department phone me to ask for help, and you can tell they don't know the Act." Whilst Gerrie does not disagree with Billy's sentiments that user skills are lacking, he cautions that if there are highly skilled users involved, then *"they may demand more complex system requirements"*. It therefore appears that whilst the skill levels of users involved in requirements definition is a prerequisite, there should be mechanisms to reduce the possibility of the requirements unduly complicating the system. This complexity could then result in users resisting the system.

It was highlighted in the interviews that technical staff must also possess the appropriate skills in defining and addressing user needs. Veronica mentioned an example where the users explained what they required from the system and the technical staff did not guide and advise users. She stated that *"we basically wrote it up for them"*, and went on to say that because the technical staff did not possess the appropriate skills, the system has ended up being too complex and not meeting the user needs. Jill shared a similar view to Veronica and stated that *"the business and systems analysts lack skills. They just ask what you want and transcribe. There is no innovation. They do not take the info from the users and test it back, there is no prioritization. There is a lack of skills in analysis."* Ria also mentioned the importance of skills from technical staff, as the user requirements must be translated into an operational system and any misinterpretation on the part of technical staff could result in the system not meeting the user needs.

Another perspective provided by Kobus in relation to the skills of technical staff, was that due to the lack of technical skills internally in the Department, the development of user requirements specifications (URS) is usually outsourced to service providers following a procurement process. This may result in different resources being brought on board for URS development, and possibly even another different set of resources being involved in the systems development and implementation. The change of resources results in a lack of continuity and leads to complexity, increasing the chances of the G2G system not being what the users needed. Kobus said that this means that *"the solution provider is at a disadvantage and has not been adequately familiar with the user requirements"*. In addition, the users themselves are required to *"constantly re-teach the business to IT consultants for each IT project,"* as highlighted in the Enterprise Architecture RFP (Request for Proposal) document (KZN DoT, 2012c). Not only does this frustrate users and introduce negative sentiments towards the project, but it also delays projects. A response to this problem is to bring in more technical resources to the Department on a longer-term basis, as seen in the Business Solutions Request for Proposal document (KZN DoT, 2012b) where the acquisition of skills to document system requirements is part of the scope of the RFP. The Enterprise Architecture RFP document (KZN DoT, 2012c) also indicates another approach to

addressing this challenge, which is to develop and document an architecture of Departmental business processes that can be leveraged and reused across multiple ICT and business projects.

5.2.3.4 Strategy as a sub-theme

The Enterprise Architecture RFP document (KZN DoT, 2012c) has highlighted the need for a systems strategy that informs the user needs. It mentions that systems are developed and implemented in isolation, addressing the needs of individual users or sections and not necessarily looking at the needs of the Department holistically. This strategy should provide an “integrated information and systems capability which is responsive to user needs”. Jill also supported the need for strategic planning of systems, indicating that *“there is a lot of duplication”*. It would therefore seem that addressing user needs has implications broader than just the needs of an individual, and that it must also consider globally the needs of the Department. Thus, the strategy represents the needs of the Department as a whole, and within each G2G project the needs of individual users must be met whilst also ensuring that the needs of the Department are not compromised. The RFP document supports this by stating the requirement for a “defined and clear path for the future of systems in KZN DOT, which will also provide direction for systems implementation and prioritisation of IT projects” (KZN DoT, 2012c). Further support of this view is provided by Ari, as he indicated the need for structures and governance mechanisms to be in place in the Department to provide oversight and direction for the implementation of G2G.

5.2.3.5 Systems development methodology as a sub-theme

The interviewees mention the lack of effective systems development methodologies as one of the reasons for not meeting user needs. Andre and Ria mentioned that effective methodologies are needed to elicit user requirements that are unclear. Similarly, the methodologies are also required to improve the chances of changes being appropriately managed when user needs change. Andre stated: *“Of course user requirements change, this is normal in systems projects. But because we don’t have the methodologies in place to govern the changes, it becomes unwieldy. More like a moving target and then there is the constant finger pointing. The business blames IT, IT blames the business.”*

Billy’s view is that systems development is an evolutionary process, and the systems development methodologies must be in place to support this evolution. He said, *“We should start small, you find that people then understand the system and the system grows and the people grow with the system.”*

Ria stated that e-Gov projects are like all other systems projects and new requirements are always coming up. This means that there is likely to be staff turnover and that there will be external factors such as a new system with which the G2G system should integrate. The methodologies used should be able to handle these scenarios, for instance by ensuring that proper system design documents are in place to improve the chances of continuity when staff leave, and by designing system interfaces in such a way as to be easily extended to integrate with new systems. The Position Paper on KZN DoT IT systems (KZN DoT, 2013b) also supports this view, by highlighting the lack of system documentation for existing systems, which makes maintenance and enhancement of these systems difficult. The Position Paper also indicates the heavy reliance on the knowledge of staff members who have since left the Department and have taken their know-how and expertise on G2G systems with them. Such issues could be minimised if a systems development methodology was used during the systems-development, implementation and maintenance phases.

Systems development methodologies are also needed to improve the likelihood of user needs being properly validated and will in fact be of value to the business. The methodologies must also improve the chances of user needs being assessed in terms of the impact they will have on other system functionality; for instance, a new requirement could cause an existing function to work incorrectly. Veronica mentioned such an instance: *“There was too much expectation from the user side, we want the system to do everything for us. It must do this function and that function. This is also making the system more complex. We need to look at what is viable. Certain things should just remain manual and the user must do it manually.”*

Veronica also provided a different view by mentioning the need for systems development methodologies to be used for enhancing the transparency in systems-development processes. She highlighted an example where *“in my opinion they were trying to take a shortcut and the developers were trying to use existing functionality and reduce the amount of work as well”*. The use of an appropriate systems development methodology could prevent developers from “trying to take a shortcut”, as they are forced to define each step of the systems design and implementation as prescribed by the methodology. Similarly, the perception that developers were taking shortcuts is also minimised, as a systems development methodology would improve the chances of business stakeholders having insight into the system design and development, and could even go so far as obtaining sign-off from the stakeholders.

5.2.3.6 Relationship with *Business Process Management* (main theme)

In order to address user needs, those needs must be defined. The needs are usually expressed in the form of business processes that a G2G system would automate. There is, therefore, a reliance

on someone, usually a person from the business environment, to articulate or validate the business processes that the G2G system will automate, prior to the system being developed. This becomes the basis of a URS defining the business needs that the system must implement. Andre, Ari and Kobus explained that URS development is problematic because the people involved in the requirements definition sometimes do not know their own business processes due to lack of knowledge on how their work is to be done. Billy supported this view, highlighting the lack of documented operating procedures and high staff turnover as some of the reasons why people employed in certain positions are not clear on how their work should be done. Andre went on to state that a process comprises a number of activities that are completed by different people, and *“usually people just know their little portion, and nobody has put the entire value chain together”*. It would therefore seem that there are challenges associated with understanding the business processes that the G2G system must automate, hence affecting whether user requirements are addressed by the system.

The lack of defined business processes, and the need to optimise existing business processes, is supported in the Enterprise Architecture RFP document (KZN DoT, 2012c). The document states that the Enterprise Architecture project should define the business processes within the Department, becoming a baseline for the requirements of systems. The Enterprise Architecture project therefore seeks to address some of the issues related to business processes and their impact on user requirements of G2G systems (KZN DoT, 2012c).

Another consideration of the impact of business process management on addressing user needs, is that there may be instances where the existing business process is inadequate and should not be implemented as is in a G2G system. In this case, if there are inefficiencies in a business process, then these inefficiencies now become automated in a G2G system. According to Gerrie, *“your business problems do not go away, they just become a hundred times faster”*. Similarly Kobus stated that *“there is a great expectation that the system will simplify but in reality the composition of all the elements introduces more complexity”*. Therefore, addressing business needs also requires elements of business process re-engineering prior to system development. Veronica supported this view and mentioned an example where the current business process was documented as is, and developed into a G2G system. The result was a system that was unnecessarily complex, as the current business process had steps that could have been streamlined. Veronica’s view was that the technical staff on the project should have provided the expertise to guide the users during the requirements definition. She stated: *“It should have been more user friendly, we are layman users. Not just taking exactly as the process is being done and develop a system.”*

5.2.3.7 Relationship with *User Involvement* (main theme)

The field data has confirmed that the users of the G2G system must be involved in defining what their needs are, to increase the likelihood that their needs will be met.

Whilst Veronica agreed with this view, she also highlighted that it is not necessary to involve all users throughout the development of a G2G system. Rather, focused user involvement seems to be a more practical approach that achieves desirable outcomes. She discussed her involvement in the development of a G2G system where she, as the business expert, provided the user requirements. The rest of the user base was consulted later on during the system-testing phase of the project and were also given the opportunity to provide their input into the business requirements. She indicated that this proved to be a useful approach, as the requirements she provided were representative of the needs of the broader user population. In addition, it was easier for the rest of the user base to provide meaningful input into the requirements during the system-testing phase, as there was already a developed system that they could see and interact with.

According to Kasturi, business users sometimes do not want to be involved in the G2G projects: *“They expect IT to deliver but at the same time they are not prepared to provide the input that is needed to bring about the changes.”* Jill supported this view and indicated that in some cases *“information on requirements is not forthcoming”*. Kasturi described this as *“overwhelming”* for IT and explained further that business users expect that *“IT must just run with it. IT must do everything without knowing what the constraints from a business perspective are. You can’t just bring about systems, solutions, without knowing the value it will bring to the business”*. Kasturi summarised the challenge of lack of user involvement in defining user requirements by stating that there is a need for *“a holistic, integrated relationship between business and IT”*.

5.2.4 Summary of field data

The field data related to the impact that *Addressing User Requirements* has on G2G User Adoption is summarised in Figure 30.

How "Addressing User Requirements" affects G2G User Adoption		
OVERALL IMPACT		
Overall impact	Similarities	Unique Stories / Differences
Overall impact that "Addressing User Requirements" has on G2G User Adoption	If user requirements are addressed, the G2G system will be adopted by users.	
FURTHER EXPLANATION OF HOW "ADDRESSING USER REQUIREMENTS" AFFECTS G2G USER ADOPTION		
Sub theme	Similarities	Unique Stories / Differences
Complexity	Complex to analyse and document user requirements	Complexity is introduced due to outdated technologies, a complex environment, lack of proper knowledge management and outsourcing of G2G system-related functions.
System development methodologies	Lack of systems development methodology; Inability to manage changing user requirements appropriately.	Developers taking shortcuts as no methodologies in place; Difficulty in making system changes, as no system documentation exists.
Resistance	Lack of buy-in	Users have alternate reasons for not wanting to use systems.
Skills	Users and technical staff must have appropriate skills to define user requirements.	Need to teach new consultants about the business for each project; Outsourcing parts of one project to multiple service providers increases demands on skills needed;
Strategy		Need for strategy defining future of systems landscape and the priority
Main theme	Similarities	Unique Stories / Differences
Business process management	Business processes must be optimised when user requirements are defined	Lack of knowledge of end to end processes
User involvement	Users must be involved in order to address their needs.	Business users sometimes do not want to be involved and expect IT to deliver alone

Figure 30. Summary of field data — How *Addressing User Requirements* affects Government-to-Government User Adoption

5.3 GOVERNMENT-TO-GOVERNMENT USER ADOPTION – *BUSINESS PROCESS MANAGEMENT*

5.3.1 Overview

The field data has shown that G2G systems have an impact on business processes. Gerrie provided an example of this: when an Enterprise Content Management (ECM) system is implemented, the user will no longer “*type up a submission and hand over to [their] manager, this is captured in the system and sent automatically through workflow*”. According to Veronica, it is necessary to understand how the G2G system will affect business processes, and appropriate changes must be made to either the process or to the system, in order for the system to be effective. Furthermore, Andre mentioned that G2G systems are sometimes implemented as a means to solve business

process problems and that this is setting up the system for failure. He indicated that it is necessary to address any business process problems first, before introducing technology to automate those processes.

5.3.1.1 Overall impact: Relationships and influences

A summary of the field data evidence for the impact of *Business Process Management* on User Adoption of G2G is shown in Figure 31. This is a summary graph showing whether interviewees supported, did not support or did not respond to *Business Process Management* and the impact it has on User Adoption of G2G. It can therefore be seen that 11 out of 15 interviews provided evidence for *Business Process Management* influencing User Adoption of G2G, i.e. they believed addressing *Business Process Management* will improve User Adoption of G2G. The remaining four interviewees did not provide a clear response.

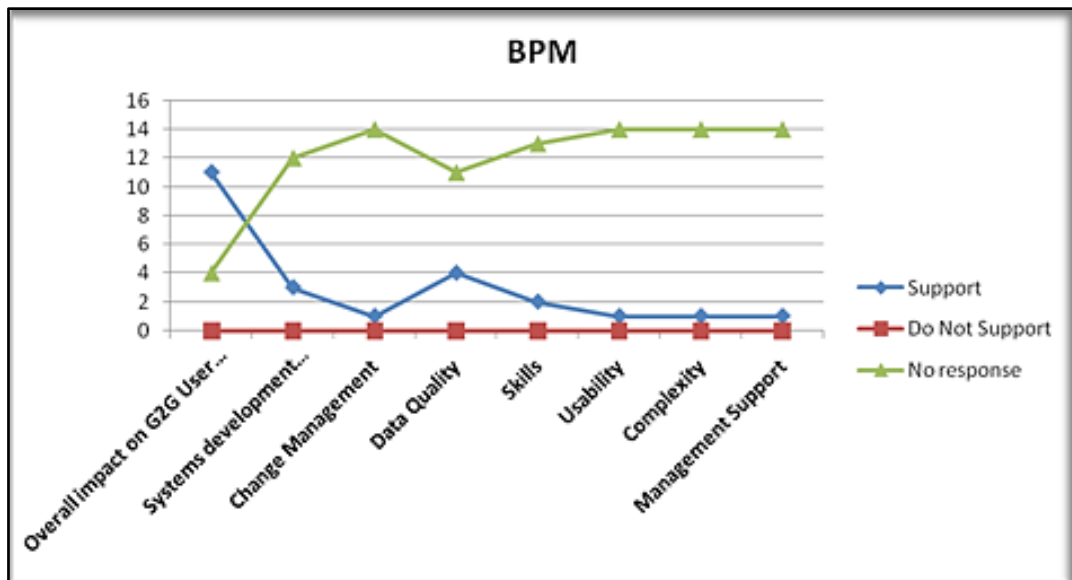


Figure 31. High-level view of interviewee responses — How *Business Process Management* affects Government-to-Government User Adoption

Figure 31 also shows the existence of field data evidence for the relationships between *Business Process Management* and the emergent themes and sub-themes. One (1) main User Adoption theme (*Change Management*) and six sub-themes (*usability, complexity, HR skills, systems development methodology, management support and data quality*) have emanated from the field data. The identified themes and sub-themes are summarised in Figure 32. Each of these themes and sub-themes is discussed in relation to *Business Process Management* in section 5.3.3, with field data evidence for the relationships also being presented.

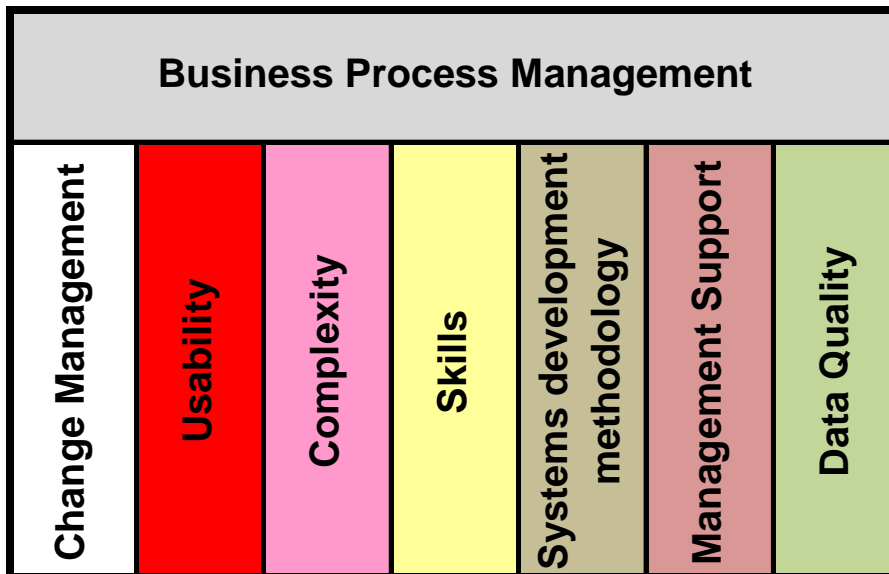


Figure 32. Themes and sub-themes related to *Business Process Management*

5.3.2 High-level view of interviewees' perspectives

Figure 33 presents the coding summary for *Business Process Management* as evident in interview data and document analysis. The “References” column shows the number of references that the source made to *Business Process Management*, whilst the “Coverage” column shows the percentage of the entire source that made reference to *Business Process Management*. The “Coverage” is also shown graphically in Figure 34, illustrating for instance that 9% of Joe’s interview yielded data relating to *Business Process Management*.

The field data itself is discussed in detail in section 5.3.3 and summarised in section 5.3.4. Figure 33 and Figure 34 also show the importance or significance of *Business Process Management* from the perspective of that particular interviewee at the time of the interview, since it shows the amount of time that the interview spent discussing the theme. It can therefore be seen that Joe, Bernice and Gerrie were the top three interviewees for whom *Business Process Management* was the most important challenge facing User Adoption of G2G.

Name	In Folder	References	Coverage
Position paper - IT Systems in KZN DoT	Internals\Document analysis\KZN DoT documents	8	3.44%
Joe - JN - Interview transcript	Internals\Interviews\Transcripts	3	8.99%
Kobus - KB - Interview Template 2	Internals\Interviews\Transcripts	2	7.08%
Andre - AB - Interview transcript	Internals\Interviews\Transcripts	1	4.00%
Gerrie - GM - Interview transcript	Internals\Interviews\Transcripts	1	7.67%
Ron - RW - Interview transcript	Internals\Interviews\Transcripts	1	5.10%
Walter - WS - Interview transcript	Internals\Interviews\Transcripts	1	3.76%
Nontoneko - NG - Interview transcript	Internals\Interviews\Transcripts	1	1.74%
Ria - RV - Interview transcript	Internals\Interviews\Transcripts	1	1.25%
Donna - DP - Template 2	Internals\Interviews\Transcripts	1	1.68%
Bernice - BN - Interview Template 2	Internals\Interviews\Transcripts	1	8.33%
Jill - JS - Interview Template 2	Internals\Interviews\Transcripts	1	2.03%

Figure 33. Field data coding summary — *Business Process Management*

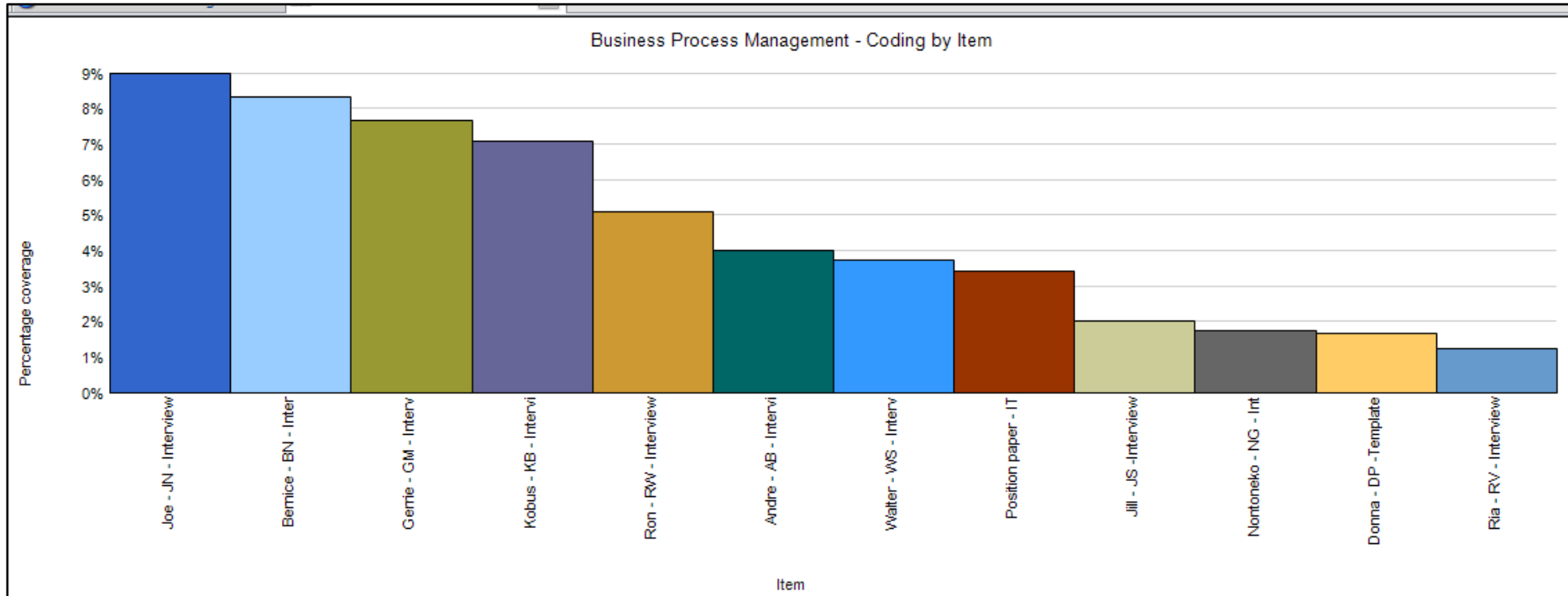


Figure 34. Field data coding chart — *Business Process Management*

5.3.3 Narratives from field data – *Business Process Management*

5.3.3.1 *Usability as a sub-theme*

Joe provided a unique view on how business processes are affected by the *usability* of the G2G system. He mentioned an example where the G2G system was required to be very easy to use, with a clear understanding of how the processes automated by the system fitted together, i.e. “*how one process fits in with another*”. However, he explains that the G2G system that he works with has a number of complex screens that make it difficult to use. Users are therefore unable to move past the usability challenges and are unable to apply the business processes correctly and consistently. Hence, it would seem that *usability* of a G2G system can affect how business processes are executed.

5.3.3.2 *Complexity as a sub-theme*

Ria described the relationship between environmental *complexity* (due to business processes) and G2G systems. She indicated that standard G2G systems could possibly be provided by national government and the same system used across all nine provincial government departments in South Africa, since the DoT, for instance, provides a similar set of services to citizens across the provinces. However, at the same time she pointed out that the back-end business processes differ from one province to another. Thus, if a standard G2G system were to be introduced by national government, this would then mean “*a change in back-end processes in provinces and this won't be easy*”. She added that if the processes are not changed to be in line with the G2G system, then the system will not be effective, or the users will continue with their own way of doing things and not use the system. It therefore seems that the different processes in each province are a form of environmental complexity that can affect the effectiveness or the adoption of G2G systems.

5.3.3.3 *Human resources skills as a sub-theme*

Technical staff on G2G projects must possess the necessary skills in re-engineering business processes prior to systems design and development, according to Joe. He stated that this is required so that the existing process can be optimised, instead of assuming that the existing process is the best way of doing things. He mentioned an example where the developers “*should not have followed the manual processes from start to end, they should have re-engineered the business process*”. In this example, the existing business process had a number of unnecessary steps that then became unnecessary steps built into the system. Joe also highlighted the need for

“developers to be knowledgeable about the business processes, they need to know the business”. Thus, according to him, it is a prerequisite for technical staff to possess knowledge about the business processes that they are building into a G2G system, instead of relying solely on the knowledge of business users.

Gerrie provided a different view and mentioned the importance of users understanding the business processes implemented in a G2G system. He indicated that the effectiveness of a G2G system is influenced by how well the users understand the process, and used data capturers as an example. He explained that data capturers must understand how the data that they are capturing will be used in the business process and that the data capture should not be seen as a mechanical task. If the data captured is incorrect or incomplete, this could influence the steps of the business process that the G2G system implements.

5.3.3.4 Systems development methodology as a sub-theme

Interviewees provided different views on how the systems development methodology used in G2G projects can affect business processes. A common thread in the interviewees' perceptions was that the methodology used should make provision for assessing current business processes and making sure that necessary changes to business processes are made.

Andre described instances where the underlying business process problems were not identified or may have been identified but were not resolved prior to the system's implementation. These problems became clearly evident after the system had gone live and *“the system [was] blamed for business problems”*. Thus, the methodology used must allow for a thorough analysis of the underlying business processes, and also, where process issues are identified, improve the chances of these issues being addressed adequately so as not to adversely affect the G2G system.

Ron and Walter indicated that as part of the systems development methodology, provision should be made to enforce the usage of the system. Ron indicated that it is necessary to make changes to business processes so that *“you can't continue doing things in the old way as you now have a system in place, this is part of the reason why users don't use the systems”*. Walter provided a similar view and mentioned that part of the problem is due to the business processes being able to operate without the system. There is a need for *“the systems to be a central part of the process, there should not be a way to get around the process without using the system. I think once you have these workarounds people tend to bypass the systems and eventually stop using it”*. The interviewees therefore hold that the systems development methodology should improve the chances for the appropriate integration of a G2G system and business processes.

5.3.3.5 Management support as a sub-theme

The field data has shown that management support is required to manage business processes affected by a G2G system. This support could be either to change the existing business processes so that they are in line with the processes automated by the G2G system, or to provide direction on how the business process should be implemented by the G2G system. The KZN DoT IT Systems Position Paper (KZN DoT, 2013b) provides an example of the latter. In the case of a Project Management G2G system that is being implemented, management decisions are required on various alternative ways of addressing the business requirements. The document indicates that “this is, however, a critical business decision which requires top management approval as there are significant impacts on processes and potentially on resourcing” (KZN DoT, 2013b: 7).

Ron explained that management support is also required to stop existing business processes and cross over to the G2G systems. According to him, “*in some way there must be a policy or directive from top management instructing that the system is the only way that this will be accepted*”.

5.3.3.6 Data quality as a sub-theme

As a business analyst Gerrie has analysed business processes as part of G2G projects. He has also experienced challenges on these projects related to the quality of data. It was therefore not surprising that he related *data quality* to *Business Process Management*. He pointed out that it must not be assumed that implementing a G2G system will make business processes easier. There may be more steps involved to complete the process on the system compared with doing it manually. However, the G2G system will improve the chances of the process being executed consistently and of there being greater transparency in the process. This will contribute to improved data quality, and since the data is now housed in a database, it will also facilitate the drawing up of reports and the analysis of trends and statistics on business processes in the Department.

Gerrie also believed that some of the data quality issues in G2G systems are because “*people just don't appreciate the value of the information in the system*”. He indicated that this is because people usually work on parts of the process and do not get an understanding of the end-to-end process. Therefore, someone performing their part of the process incorrectly or not completing their part may affect another part of the process later on, possibly also affecting the data later on in the process. Thus, Gerrie believed that effective business process management may contribute to improved data quality in G2G systems. This view is supported by Donna, who has also had experience with data quality influencing the effectiveness of a G2G system.

Bernice mentioned that poor-quality data in a G2G system means that the system is not useful for executing business processes in a department. According to her, *“If the data is incorrect then the reports which are produced are not a true reflection. You cannot use the reports to make management decisions or use it for your business processes.”* Bernice also described a public portal, which is a form of e-Gov system, where only a limited number of departmental users have captured data on the portal. The lack of data limits the effectiveness of the portal.

Another view on the impact of data quality on business processes was expressed by Kobus. He believed that the effectiveness of G2G is achieved by integrating and sharing data between different G2G systems. However, one of the challenges in integrating G2G systems is *“breaking down barriers and correlating data sets”*. He believed that this challenge can be overcome by *“interfacing systems and business processes”*. Thus Kobus believed that if G2G systems are made an integral part of business processes, then this can improve the quality of the data shared between systems. Kobus also mentioned that as more systems are introduced, the number of data types to be integrated increases and that the interfaces between systems must constantly be kept up to date to remain relevant and accurate.

5.3.3.7 Relationships with Change Management (main theme)

Gerrie indicated that *“a G2G system affects business processes quite a lot, it is about moving from manual to computerised and established procedures need to be changed”*. He provided an example of moving onto an Enterprise Content Management (ECM) system. In the manual process a user would write correspondence and file a copy in a registry. On the ECM system, the correspondence will be automatically routed to the recipient through a workflow process and filed automatically on an electronic filing system. He indicated that such business process changes, where a user moves from a highly manual process to a highly automated process, require significant change management. The change management must make users aware of how the existing business processes will change when the system is implemented. Change management must also go further to provide reassurance to users that the G2G system will not *“replace them”*. Gerrie pointed out that change management is especially important when the users affected by the G2G system have low levels of computer literacy, as is often the case when users work mainly on manual processes. Even though Gerrie highlighted the importance of changing business processes to improve chances of user adoption, Jill’s experience was that change management is not applied to business processes when a system is introduced in the Department. She indicated that *“they do not change the business processes, the system is a separate exercise. And then processes are not adapted to the system”*.

5.3.4 Summary of field data

The field data related to the impact that *Business Process Management* has on G2G User Adoption is summarised in Figure 35.

How "Business Process Management" affects G2G User Adoption		
OVERALL IMPACT		
Overall impact	Similarities	Unique Stories / Differences
Overall impact that "Business Process Management" has on G2G User Adoption	The impact of G2G on business processes must be established; Either the business process or the G2G system must be changed to ensure user adoption.	G2G is sometimes implemented as a means to solve business process problems. This presents challenges to G2G user adoption.
FURTHER EXPLANATION OF HOW "BUSINESS PROCESS MANAGEMENT" AFFECTS G2G USER ADOPTION		
Sub theme	Similarities	Unique Stories / Differences
Systems development methodology	Methodologies must make provision for assessing business processes; Methodologies to ensure that changes to business processes are made.	
Data Quality	High quality data is needed from G2G, in order to increase effectiveness of support provided for business processes; G2G must be integrated into business processes to improve data quality;	Users work on parts of the business process only, and hence do not understand how their part can impact on data quality further on in the business process
Skills	Technical staff must understand the business processes supported by G2G; Technical staff must possess skills in business process re-engineering.	Users must understand how G2G implements the business process to increase the effectiveness of G2G.
Usability		Systems must be user friendly so that business processes automated by G2G can be executed effectively.
Complexity		Business processes differ across environments, introducing complexity for the G2G systems supporting those business processes.
Management Support	Management supported needed to change the existing processes to be in line with G2G; Management support also needed to provide direction on how business processes must be implemented by G2G.	Management must support the cut over from manual processes to automated processes.
Main theme	Similarities	Unique Stories / Differences
Change Management	Change management must create awareness of how business processes will be affected by G2G	

Figure 35. Summary of field data — How *Business Process Management* affects Government-to-Government User Adoption

5.4 GOVERNMENT-TO-GOVERNMENT USER ADOPTION — *CHANGE MANAGEMENT*

5.4.1 Overview

Change Management was mentioned by some of the interviewees as being “*the most important component of user adoption*” (Ron). Some of the reasons mentioned for its importance are to obtain buy-in from the users to get their support for the system, and to create awareness of what changes will be introduced by the G2G system and how they will affect them. Ron indicated that “*you cannot just say that from today onwards forget how you did things over the last 10 years, just start using the system*”. In a similar vein, Gerrie elaborated: “*People, users or potential users need to be led and not pushed. They must be drawn into the change and of course informed of the change. A system brings very different changes to the job and they need a sense of the change*”.

Despite acknowledging the importance of change management, interviewees also highlight that change management is not implemented adequately. Ria went so far as to say that “*it is non-existent*”, and says that she has never experienced any real change management at all. Jill shared a similar view and indicated that “*we are not aware of who are the right people, or even the number of people to be involved in change management. It is not planned, and then you don’t see the impact of the system*”. Gerrie’s view was that it is “*just glossed over. It’s seen as an unnecessary expense. It is undervalued and it is not done right*”. Therefore, due to budget constraints, change management is often a scope item which is left out or reduced, even though it has an important role to play to improve the chances of user adoption of G2G systems.

5.4.1.1 Overall impact: Relationships and influences

A summary of the field data evidence for the impact of *Change Management* on User Adoption of G2G is shown in Figure 36. This is a summary graph showing whether interviewees supported, did not support or did not respond to *Change Management* and the impact it has on User Adoption of G2G. It can therefore be seen that 10 out of 15 interviews provided evidence for *Change Management* influencing User Adoption of G2G, i.e. addressing *Change Management* will improve User Adoption of G2G. The remaining five interviewees did not provide a clear response.

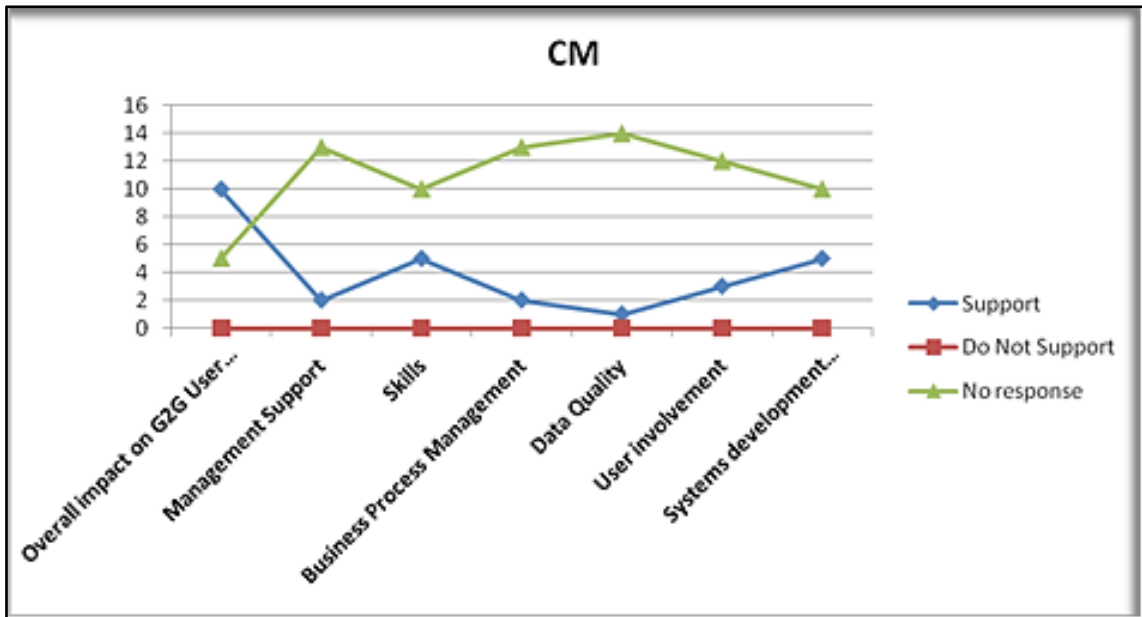


Figure 36. High-level view of interviewee responses — how *Change Management* affects Government-to-Government User Adoption

Figure 36 also shows the existence of field data evidence for the relationships between *Change Management* and the emergent themes and sub-themes. Two main User Adoption themes (*Business Process Management* and *User Involvement*) and four sub-themes (*HR skills*, *systems development methodology*, *management support* and *data quality*) have emanated from the field data. The identified themes and sub-themes are summarised in Figure 37. Each of these themes and sub-themes is discussed in relation to *Change Management* in section 5.4.3, with field data evidence for the relationships also being presented.

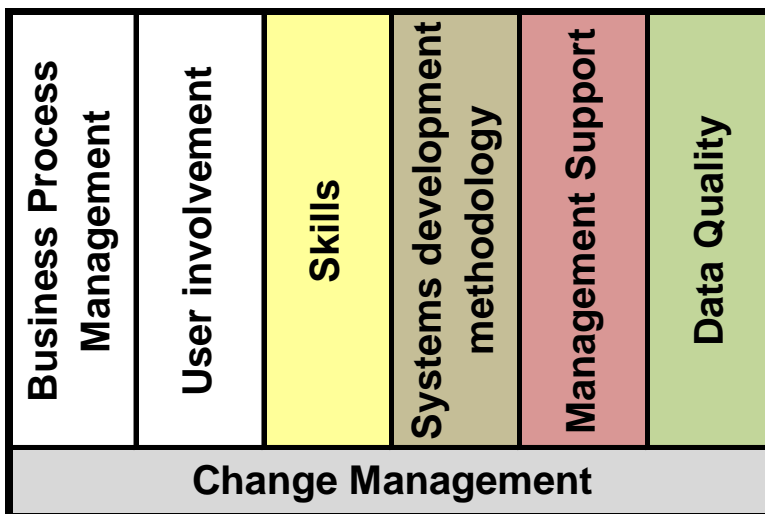


Figure 37. Themes and sub-themes related to *Change Management*

5.4.2 High-level view of interviewees' perspectives

Figure 38 presents the coding summary for *Change Management* as evident in interview data and document analysis. The “References” column shows the number of references that the source made to *Change Management*, whilst the “Coverage” column shows the percentage of the entire source that made reference to *Change Management*. The “Coverage” is also shown graphically in Figure 39, illustrating for instance that 25% of Bernice’s interview yielded data relating to *Change Management*.

The field data itself is discussed in detail in section 5.4.3 and summarised in section 5.4.4. Figure 38 and Figure 39 also show the importance or significance of *Change Management* from the perspective of that particular interviewee at the time of the interview, since it shows the amount of time that the interview spent discussing the theme. It can therefore be seen that Bernice, Kobus and Ari were the top three interviewees for whom *Change Management* was the most important challenge facing User Adoption of G2G.

Name	In Folder	References	Coverage
Kobus - KB - Interview Template 2	Internals\Interviews\Transcripts	6	18.89%
Ari - BA - Interview Template 2	Internals\Interviews\Transcripts	5	17.11%
Position paper - IT Systems in KZN DoT	Internals\Document analysis\KZN DoT documents	4	3.51%
Bernice - BN - Interview Template 2	Internals\Interviews\Transcripts	4	25.54%
Billy - BA - Interview transcript	Internals\Interviews\Transcripts	2	5.58%
Jill - JS - Interview Template 2	Internals\Interviews\Transcripts	2	7.33%
Gerrie - GM - Interview transcript	Internals\Interviews\Transcripts	1	9.84%
Ria - RV - Interview transcript	Internals\Interviews\Transcripts	1	1.77%
Ron - RW - Interview transcript	Internals\Interviews\Transcripts	1	5.29%
Walter - WS - Interview transcript	Internals\Interviews\Transcripts	1	5.57%
Kasturi - KG - Template 2	Internals\Interviews\Transcripts	1	3.52%

Figure 38. Field data coding summary — *Change Management*

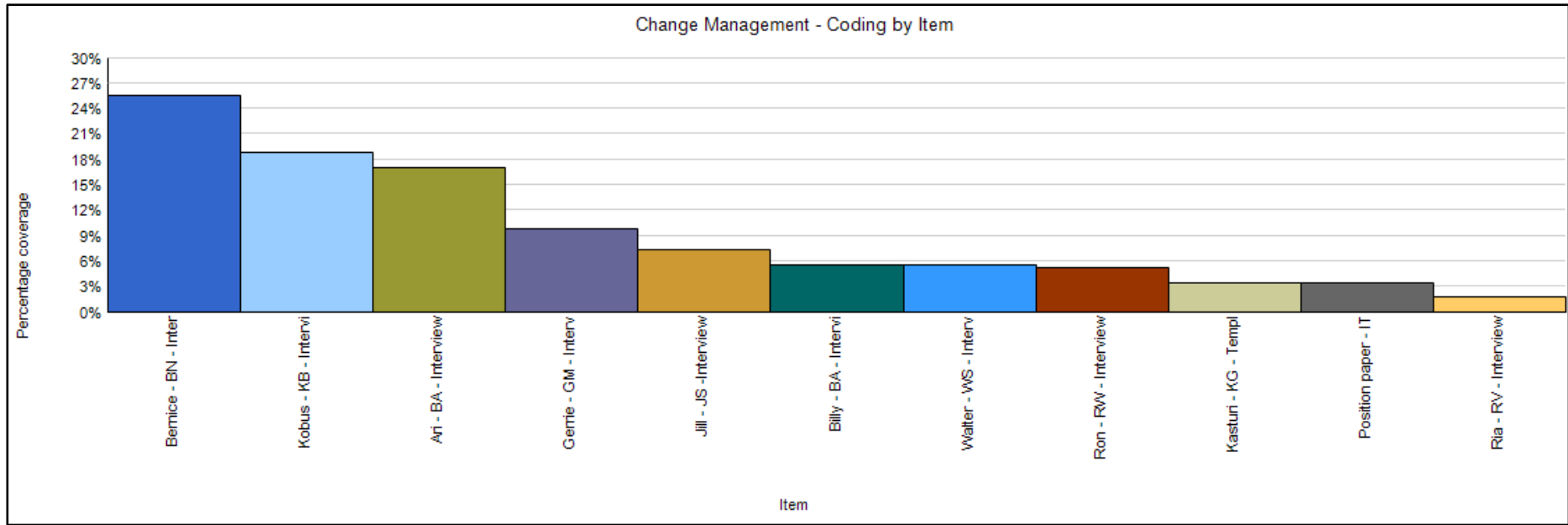


Figure 39. Field data coding chart — *Change Management*

5.4.3 Narratives from field data — *Change Management*

5.4.3.1 *Human resources skills as a sub-theme*

Billy mentioned the need to have the right skills to drive the change. He indicated that it is necessary to have someone “*in the field*” and that change cannot be enforced at arm’s length. This is particularly important when it comes to decentralised sites, as “*you cannot drive system implementation from Head Office*”. The role of that person would be to champion the system, to provide immediate support to users as they experience difficulties in using the system and to provide a line of communication between the users and Head Office. This person would play a critical role in ensuring that the expectations that Head Office has in terms of systems usage are communicated to users and are fulfilled; he or she would also improve the chances of users’ perceptions and needs being communicated back to Head Office and factored into system enhancement or modifications.

Billy further mentioned issues related to HR capacity as he indicates that some “*posts are not filled, or filled by the wrong people*”. He once again emphasised that you need to have the right person who knows the system and is able to change the mind-sets of the users. Ari agreed that there is not enough HR capacity to bring about change effectively, whilst Kobus mentioned that users work full time on their existing jobs and hence “*people do not have the time to go through planned change processes such as training*”. Kobus highlighted the importance of “*both leaders and followers*” for change management to influence the user adoption of G2G positively. Thus, HR capacity to implement and receive change management is important.

Ari indicated that “*a fairly low level of computer literacy*” from users and management affects their ability to use a G2G system effectively, and in this case the change management processes must place emphasis on skills development. Kasturi indicated that ICT staff must also be adequately skilled so as to advise business on proposed changes to G2G. She stated that the business “*will be looking to IT for advice and if you haven’t got the proper trained people within IT they not going to be giving the proper advice to the business; which could actually have huge cost implications.*” Thus, change management must improve the chances of appropriate business and technical skills being developed in G2G, and appropriate technical skills are also needed to improve the chances of G2G changes being implemented effectively.

5.4.3.2 *Systems development methodology as a sub-theme*

The Position Paper on IT Systems in the KZN DoT (KZN DoT, 2013b) indicates that a systems development methodology will introduce measures to bring about change management. This

could address the concern raised by Ari, who stated that *“there is no systems methodology and no official procedures for big changes”*. Similarly, Kobus raised the concern that *“change processes may have been identified but not adequately addressed. It is recognised in theory but there are constraints”*. The measures in the Position Paper to address change processes related to systems development include assigning a system owner who is accountable for each system and who comes from the business environment. This approach will improve the chances of the system owner driving the system changes that are needed from the business perspective, and conversely driving the changes needed in the business environment to improve the chances of the adoption of the system. The ultimate accountability for the system will also reside with a business person and not with an ICT person, in order to align the business needs with system functionality (KZN DoT, 2013b).

The Position Paper also describes how the systems development methodology will operationalise user groups. The user groups will serve as a platform where the business users directly engage with the system and ICT stakeholders. This facilitates two-way communication between the parties and serves as a means of change management. A greater awareness of the needs and challenges faced by the business users can be fostered, and awareness of the constraints and technical implications of system changes is also created as the ICT stakeholders share information with the business users (KZN DoT, 2013b).

One aspect that a systems development methodology should address is providing adequate support to users after the implementation of a G2G system, and ensuring that the support can continue to be provided once technical staff leave the Department or project. This was mentioned by Bernice, Jill, Donna and Kobus. Bernice stated: *“When there is staff turnover the client suffers, the project deteriorates, risks materialise, and the reputation is jeopardised. You don’t have someone to take over and assume one person can run with the entire project.”* She described a case where *“we had four developers and now we have one left, they all left one at a time,”* and attributes the main issues to a lack of knowledge sharing and lack of contingency measures being in place for continuation should staff leave. Jill mentioned that systems development methodologies have in the past *“not emphasised implementation and post-implementation support very well. Suppliers will walk off and there is limited support. The business sees support as an expense. Initially they are enthusiastic; they think that there are no bugs, no problems. And they do not see the need for support. Then the Department is left to run with it themselves”*. Bernice mentioned that providing post-implementation support is difficult as *“documentation is lacking on systems. There is no User Requirements Specification and information resides in people’s heads. It makes it hard to continue supporting the system when that person leaves.”*

5.4.3.3 Management support as a sub-theme

Support from management was mentioned by interviewees as a contributor to effective change management. Top management must visibly support the G2G system by being an active part of the system design and implementation. Management were also expected to understand the value of the system and communicate this to their staff. According to Ria, *“buy-in needs to be driven from the General Manager level”*, whilst Ari believed that *“there should be a driver from the top as people on the ground are not used to procedures for change”*. Ari also indicated that in the Department people believe that *“whatever the boss says you do”*, emphasising the importance of management supporting G2G so that users would also support it.

Billy mentioned examples where the management support was not present. He indicated that they *“have other priorities, systems are not priorities”*. This lack of management support meant that the users were not focusing on using the system and management endorsed the lack of system use. Therefore, in this example, lack of management support for the G2G system served as negative change management.

5.4.3.4 Data quality as a sub-theme

Gerrie provided a unique view where the quality of the data of the system contributed to change management. He believed that if the data that the system produces is of a high quality, then this will serve as a means of change management by encouraging the change. It will prove the value of the system to users and this in turn will foster greater user buy-in and support for the system.

He also mentioned that data quality is often overlooked and *“people just don’t appreciate the value of the information in the system”*. Thus even though data quality can have an impact on the user adoption of the G2G system, it is not given enough priority and attention.

5.4.3.5 Relationship with Business Process Management (main theme)

A G2G system affects and possibly changes business processes in the Department, and interviewees believe that these business process changes must be effectively managed. According to Jo, *“people need to get an idea of how the processes are to be changed, and this is not enough of a focus”*. Thus change management must emphasise how the G2G system will affect the business processes. Kobus, however, stated that this emphasis on business process changes is not present, and that training is mainly around system functionality and not focused on integrating the system into the *“processes which they are accustomed to”*. Kobus stated that the *“training is technology focused and not business-process driven. The system can do it, here’s how it is done.”*

And the user is left asking — so what?” He added that this differentiates “*installation versus an implementation*”, where the former is merely introducing technology whilst the latter implements technology in the business environment to bring about business value.

A related view was shared by Gerrie. He indicated that change management must include user awareness of how their business process will affect the system. In particular, if “*the impact of their part of the process is not done correctly*”, this in turn improves chances that “*everyone gets to know how important their part of the process is*”. Thus change management must incorporate awareness of how the business process affects the G2G system.

5.4.3.6 Relationship with *User Involvement* (main theme)

The interviewees believed that involving users in the process of systems development serves as a form of change management. The involvement facilitates user buy-in to the system and establishes a sense of “*system ownership*” (Andre). However, both Ron and Walter cautioned that the involvement of users must not only be involvement “*at face value*”. The users must be able to participate in the process in a constructive way and also be empowered to make decisions that influence the G2G system design and implementation. They believed that it is only if this happens that the user involvement can serve as an effective form of change management. Similarly, Ari states: “*You need buy-in from all stakeholders, people on the ground must know the value and there must be communication. E-mails are one thing, but it must go further than that as my job is under threat.*”

Nontobeko indicated that “*sometimes we do not even involve the users, but this is not the way that it should be done*”, highlighting the need for more user involvement in the Department. Ari agreed with the need for user involvement, and believed that if there is “*awareness and training for the people on the ground*” then there will be “*more acceptance and usage*” of G2G. Whilst Ron also agreed with this view, he elaborated that for the user involvement to be effective, a conducive environment must be established. The users must be made to “*feel safe and secure so that they actually do participate*”. He indicated that users are often not ICT experts and hence “*may feel intimidated even if you do involve them*”.

5.4.4 Summary of field data — *Change Management*

The field data related to the impact that *Change Management* has on G2G User Adoption is summarised in Figure 40.

How "Change Management" affects G2G User Adoption		
OVERALL IMPACT		
Overall impact	Similarities	Unique Stories / Differences
Overall impact that "Change Management" has on G2G User Adoption	Change management must be implemented to ensure G2G user adoption; Even though change management is important, it is not done on G2G projects;	
FURTHER EXPLANATION OF HOW "CHANGE MANAGEMENT" AFFECTS G2G USER ADOPTION		
Sub theme	Similarities	Unique Stories / Differences
Skills	Skills in change management is required; Lack of HR capacity affects the implementation of change management;	IT technical skills are needed to ensure that changes to G2G are effectively implemented
Data Quality		High quality data provided by G2G can serve as a form of change management, as it provides evidence of the value of G2G
Systems development methodology	Methodologies do not adequately cater for change management; Methodologies must ensure that support is provided to users post-implementation;	User groups can be implemented as a means of change management
Management Support	Management support is required to ensure that change management is effective; Management must be part of G2G design and implementation; Management must communicate value of G2G to their staff;	Lack of support from management can negatively affect adoption of G2G
Main theme	Similarities	Unique Stories / Differences
Business Process Management	Change management must emphasize how business processes will be affected by G2G; G2G training serves as a form of change management, but it is often technology focussed and not business process driven;	
User involvement	User involvement in G2G is a form of change management	There are instances where users are not involved at all in G2G; User involvement must be done in a conducive environment to be effective form of change management, as users are sometimes intimidated by IT;

Figure 40. Summary of field data — How *Change Management* affects Government-to-Government User Adoption

5.5 GOVERNMENT-TO-GOVERNMENT USER ADOPTION – *USER INVOLVEMENT*

5.5.1 Overview

The involvement of users was emphasised as a contributing factor to the adoption of G2G. Nontobeko indicated that “*we need to obtain information from users not managers, that way we get more accurate information on the needs. We need to involve the right people*”. Walter agreed that users must be involved “*throughout the whole process*” as they will eventually use the system. He used an analogy to explain the importance of involving the right users: “*I mean you do not send someone else to buy a car that you will drive*”.

5.5.1.1 Overall impact: Relationships and influences

A summary of the field data evidence for the impact of *User Involvement* on User Adoption of G2G is shown in Figure 41. This is a summary graph showing whether interviewees supported, did not support or did not respond to *User Involvement* and the impact it has on User Adoption of G2G. It can be seen that 12 out of 15 interviews provided evidence for *User Involvement* influencing User Adoption of G2G, i.e. that involving users will improve user adoption of G2G.

Two interviewees provided contrary views, whilst one interviewee did not provide a clear response. The reasons for the contrary views are that these interviewees believed that the more users are involved, the more complex the system can become, and that there is a lack of appropriate skills in the user environment. Thus involving users will not necessarily improve user adoption of G2G.

Figure 41 also shows the existence of field data evidence for the relationships between *User Involvement* and the emergent themes and sub-themes. Two main User Adoption themes (*Business Process Management* and *Change Management*) and five sub-themes (*HR skills, resistance, systems development methodology, management support* and *data quality*) have emanated from the field data. The identified themes and sub-themes are summarised in Figure 42. Each of these themes and sub-themes is discussed in relation to *User Involvement* in section 5.5.3, with field data evidence for the relationships also being presented.

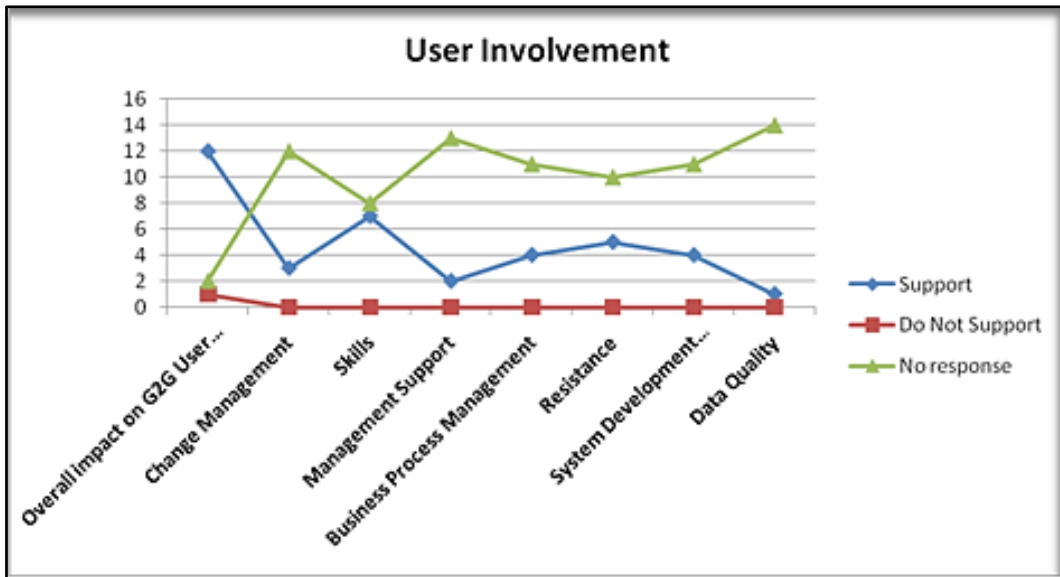


Figure 41. High-level view of interviewee responses — How *User Involvement* affects Government-to-Government User Adoption

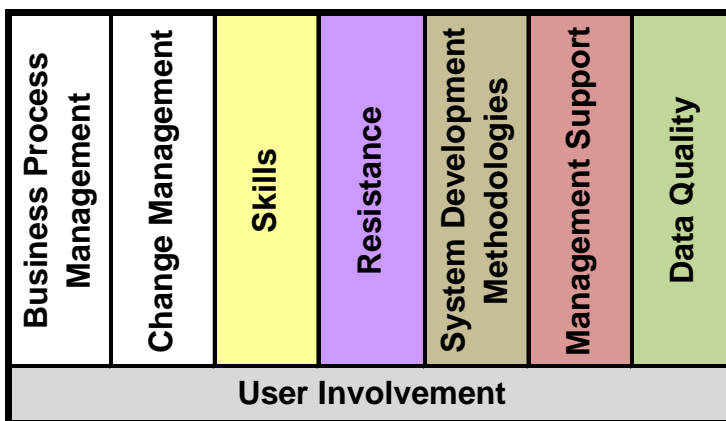


Figure 42. Themes and sub-themes related to *User Involvement*

5.5.2 High-level view of interviewees' perspectives

Figure 43 presents the coding summary for *User Involvement* as evident in interview data and document analysis. The “References” column shows the number of references that the source made to *User Involvement*, whilst the “Coverage” column shows the percentage of the entire interview that made reference to *User Involvement*. The “Coverage” is also shown graphically in Figure 44, illustrating for instance that 19% of Kasturi’s interview yielded data relating to *User Involvement*.

The field data itself is discussed in detail in section 5.5.3 and summarised in section 5.5.4. Figure 43 and Figure 44 also show the importance or significance of *User Involvement* from the perspective of that particular interviewee at the time of the interview, since it shows the amount of

time that the interview spent discussing the theme. It can therefore be seen that Kasturi, Gerrie and Donna were the top three interviewees for whom *User Involvement* was the most important challenge facing User Adoption of G2G.

User Involvement			
Name	In Folder	References	Coverage
Kasturi - KG - Template 2	Internals\\Interviews\\Transcripts	6	19.20%
Gerrie - GM - Interview transcript	Internals\\Interviews\\Transcripts	5	17.01%
Donna - DP - Template 2	Internals\\Interviews\\Transcripts	4	15.49%
Bernice - BN - Interview Template 2	Internals\\Interviews\\Transcripts	4	9.65%
Jill - JS - Interview Template 2	Internals\\Interviews\\Transcripts	4	13.18%
Position paper - IT Systems in KZN DoT	Internals\\Document analysis\\KZN DoT documents	2	1.94%
Billy - BA - Interview transcript	Internals\\Interviews\\Transcripts	2	14.46%
Nontoneko - NG - Interview transcript	Internals\\Interviews\\Transcripts	2	3.62%
Ron - RW - Interview transcript	Internals\\Interviews\\Transcripts	2	7.36%
Veronica - VA - Interview transcript	Internals\\Interviews\\Transcripts	2	13.44%
Walter - WS - Interview transcript	Internals\\Interviews\\Transcripts	2	9.95%
Kobus - KB - Interview Template 2	Internals\\Interviews\\Transcripts	2	6.69%
Business Solutions SLA - RFP	Internals\\Document analysis\\KZN DoT documents	1	0.06%
Andre - AB - Interview transcript	Internals\\Interviews\\Transcripts	1	4.05%
Ria - RV - Interview transcript	Internals\\Interviews\\Transcripts	1	4.52%

Figure 43. Field data coding summary — *User Involvement*

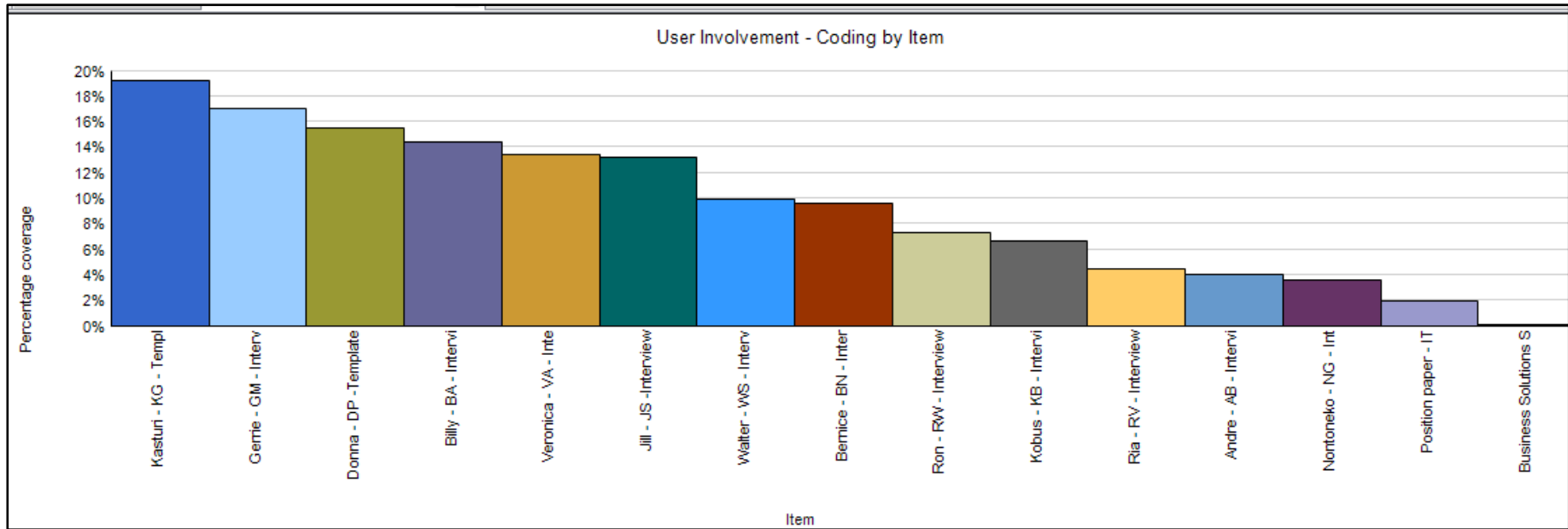


Figure 44. Field data coding chart — *User Involvement*

5.5.3 Narratives from field data – *User Involvement*

5.5.3.1 *Human resources skills as a sub-theme*

User Involvement was mentioned by Bernice as a contributor to building user skills on the G2G system. Users learn as they provide system requirements; they also learn as they test the system functionality.

The training of users is a form of user involvement that interviewees viewed as critical to the success of G2G. Gerrie mentioned that the right users must be identified for training, whilst Ron said that if users are not properly trained then *“they will feel frustrated if they don’t know how to do something on the system”*. Billy, however, discussed an example where several training interventions were held to develop user skills, without improvements. He said, *“Tim went out there and got them trained up but still they come back and say they don’t know how to use it.”* Billy mentioned that he felt the issue is that the users did not possess the adequate prerequisite business knowledge and skills, making it difficult to understand the system functionality. He said, *“They should have done it at Technikon, what they did at Tech I don’t know.”*

Interviewees indicated that involvement of users is important to obtaining accurate user requirements. According to Gerrie, *“specialist skills”* are often required as G2G systems focus on processes that require subject-matter expertise. However, Bernice indicated that *“we don’t have subject matter experts in the fields, the Department has a vision and they need to realise we need the resources with the capabilities”*. Jill supported this view and mentioned the engineering field, where there is a shortage of skills and an inability to provide the requirements of the system. Similarly, Walter indicated that *“users probably know the environment best. They know what will work and what will not be practical”*. Gerrie also cautioned that when specialist users are involved, the system requirements tend to become overly complex. In this vein Walter believed that the ICT specialists must guide the users with decision making and requirements, *“as it is very easy to get carried away”*.

User involvement is also dependent on the availability of people with the right skills to participate in the G2G project. Nontobeko mentioned *“time management”* as a factor, highlighting that the users who need to be involved often do not have adequate time to devote to the G2G project. Thus the capacity of the HR skills influences the involvement of users in G2G.

Jill indicated that a reason for poor management involvement in G2G systems is because *“Senior Managers with an understanding of IT is a scarce skill. You find they have never had experience and there is a mismatch of expectations. They need to have IT knowledge and be champions to*

drive systems. You need higher-level staff to verify or validate the data from the system". She added that there is lack of appreciation for ICT from management, and therefore they do not participate in projects, and that *"you have amateur IT experts and there are internal politics and power games at play"*.

5.5.3.2 Resistance as a sub-theme

The interviewees believed that involving users in the G2G systems-development process will reduce the possibility of users resisting the use of the system. Ria stated that *"if they are not involved you often find that they don't want to use the system thereafter"*. Kobus shared similar views and indicated that *"the requirements definition must be done in conjunction with the users and that applies to any environment"*. He elaborated with an example where a manager defined the user requirements without user involvement, resulting in the creation of *"a complete barrier in terms of user adoption"*.

Whilst Donna felt that sometimes resistance is because *"people are threatened as they feel they may not have a job in the future"*, involving the users may allay some of these fears as they become more aware of what the G2G system seeks to achieve and how it will affect them. At the same time, however, Donna also mentioned that *"some people it's their attitude. They are just difficult, it's a mind-set thing and they do not embrace change no matter how much they are involved"*. Kasturi had similar sentiments and felt that *"because of the mind-set of individuals they do not want to change, they don't want to adapt and that becomes quite a challenge"*. She elaborated that *"because people have been in a set environment for years they are still adamant that the system they are currently using works and so why change?"* Kasturi mentioned that effective change-management processes right from the outset of the project are important to address such challenges.

Ria also indicated that even when users are involved, *"things are too fluid. Someone likes the system in a certain way and then it is built like that but then some else does not like it that way and refuses to use the system"*. It would therefore seem that user involvement alone is insufficient to address user resistance. Ria elaborated that *"there are not enough mechanisms in place to ensure there is consultation and representation and that the right people are making decisions"*. Kasturi supported this view and provided an example of where one particular person was usually involved in G2G projects. She mentioned that this poses a risk as the views of only one person are considered and there is a heavy reliance on that particular person. She felt that there is a need to rather *"put a task team together, that would initiate more interest and those people can also go out and create awareness of what they are doing and how it will make people's jobs easier. So it also serves as overcoming resistance"*.

According to Ron, user resistance becomes an issue when the training on the system is ineffective. He said that even though users may be involved through the training, if they still don't know how to use the system, then *"they try to avoid it at all costs"*.

5.5.3.3 Systems development methodology as a sub-theme

Systems development methodologies play a role in ensuring that the right users are identified and involved during the G2G project. The methodology will also influence what role the users play in the project and at which point in time they are involved. The interviewees provided insight into these relationships between the systems development methodologies and involvement of users.

Andre and Ria mentioned that sometimes it is not possible to involve all users as there are *"just too many users"* (Andre). The methodology used should, however, provide an approach for identifying and involving representative users and possibly even disseminating information back into the broader user base. According to Ria, *"usually you just identify the administrator and super users, the rest are not involved"*. Billy agreed that it is not always practical to involve all users. He indicated that they have started involving decentralised sites in projects, something they did not do previously. However, still only certain users are involved: *"It's just the closest region, not all regions are involved"*.

Andre also mentioned that there are cases where *"we do not know who the users of the system will be, management themselves may not know this at the time of development"*. Therefore, there may be instances where it is not possible to involve users in the G2G development process.

Veronica mentioned that users from various units were involved in her G2G project, mainly during the testing phase. Whilst the primary objective of the involvement was to test for system errors, it also served to *"expose them to the system and give them the opportunity to advise if there were new requirements"*. Similarly, the KZN DoT Business Solutions Request for Proposal (RFP) (KZN DoT, 2012b) mentions the need for users to be involved in system testing, and a component of this RFP is for a service provider to facilitate the user involvement in system testing. The service provider will also be expected to facilitate user sign-offs on systems. The involvement of users during systems-testing processes and the formalisation of system acceptance would therefore seem important.

The KZN DoT Business Solutions RFP (KZN DoT, 2012b) and KZN DoT IT Systems Position paper (KZN DoT, 2013b) both highlight the importance and need for user involvement after the implementation of systems. This could be achieved through assigning system owners from the user community and the establishment of user groups. The user groups serve as a forum for users

to communicate their system issues and needs to the technical teams, ensuring that the system remains relevant to the business environment. One component of the KZN DoT Business Solutions RFP (KZN DoT, 2012b) is for a service provider to establish, facilitate and provide expertise on these user groups. The user groups are hence a means of ensuring the involvement of users after the implementation of G2G.

5.5.3.4 Management support as a sub-theme

The field data has shown that the involvement of management in G2G projects can improve user involvement. Billy indicated that there is not enough oversight from management to ensure that users are involved and to improve the chances of users using the system appropriately. He also indicated that G2G systems are not a priority for management, as they *“prioritise what they need, but that’s not what we need and certainly not what the system needs”*. Thus the involvement of management could address the issues highlighted by Billy. Jill also raised the need for management involvement to prioritise the G2G system so that users can be *“taken out of their work environment to work on the system. The system is an additional thing on top of their workload and often they do not have the time”*.

Billy also highlighted the need for management involvement to be effective. He mentioned examples where management were involved and were part of the decision-making processes related to the system; however, the information regarding the system was not disseminated to the end users. In one case, he said, *“nobody knew it was coming”* even though top management was involved and had agreed to the system decisions.

5.5.3.5 Data quality as a sub-theme

The involvement of users serves as a means to improve the data quality of G2G, particularly where data is migrated from a legacy system. Veronica mentioned such a case where the data taken on from the legacy system into the new G2G system had redundant data and a number of *“type errors which were all transferred to the new system”*. Whilst technical staff may be able to identify these data issues to some extent, the users’ intimate knowledge of their own data could improve the likelihood of identifying data-quality issues sooner rather than later.

5.5.3.6 Relationship to Business Process Management (main theme)

Gerrie indicated that user involvement is important for effective business process management. According to him, G2G will have a significant impact on processes and *“established processes*

will need to be changed". Involving users throughout the systems-development process will improve the chances of them being made aware of how the processes will be changed, contributing to the effective integration of the G2G system into the business environment. Linked to Gerrie's view, Donna indicated that some people are keen and others are not when it comes to the changing of business processes to adapt to G2G systems. She indicated that *"usually it's the end users that are resistant. Management sees the value to the business; they see IT as an enabler. But users and lines of business are threatened and do not want to change the way they work to include the system"*.

Gerrie emphasised that the involvement of users will increase the likelihood that the processes implemented by the G2G system are actually aligned to how *"the users do things in real life"*. He elaborated that whilst expertise from ICT specialists is important, a clinical approach cannot be taken where users are excluded, as the processes do not operate in a vacuum. The ICT specialists will not possess the contextual, historical and environmental knowledge and experience that the users possess. It would therefore seem that user involvement reduces the risk of the G2G system implementing inaccurate or ineffective business processes. However, Jill cautioned that involvement of users may prove challenging when there is a lack of consensus from *"players in the Department, [and] everyone has a view on what should be the approach and the processes"*.

Kasturi described the *"approval processes within Government"* and *"too much red tape"* as some of the challenges that make implementation of G2G systems challenging. She said that even when the system requirements are driven by legislation, *"it is not easily implementable; it follows a process as well even though there is legislative change to bring about"*. Whilst other interviewees emphasised the need to change business processes that the G2G system automates (e.g. if it is a finance system, then the need to change financial processes), Kasturi pointed out that existing processes in the Department (such as obtaining approvals for implementing the changes to the finance processes) also pose a challenge to G2G.

5.5.3.7 Relationship to Change Management (main theme)

Interviewees have indicated that user involvement serves as a form of change management when G2G is being implemented. According to Andre, *"if they participate in the development process there is a sense of ownership of the system and they are more likely to embrace it"*. Andre also mentioned that when there are problems with the system, then users will be more understanding and possibly even assist with resolving the issues if they have been part of the development process. He indicated that *"that's because they have been part of the whole development journey and feel as if partially it is their baby as well"*. Thus, user involvement could also assist with

addressing the issue mentioned by Ria; as she said, users can be very critical of new G2G systems and will *“complain about every little thing that goes wrong on the system”*.

Kasturi emphasised that user involvement in the form of awareness, training and user groups serves as change management. She said that these interventions will bring about an *“understanding that the change is going to bring about efficiency in their jobs, it’s going to bring about effectiveness in the way that they perform their functions and at the end of the day you have to look at the value it’s going to bring to the business”*. Donna, however, mentioned that even though these change management interventions are important, *“this is where Departments are cutting costs. They just do not see the importance of it”*.

5.5.4 Summary of field data

The field data related to the impact that *User Involvement* has on G2G User Adoption is summarised in Figure 45.

How "User Involvement" affects G2G User Adoption		
OVERALL IMPACT		
Overall impact	Similarities	Unique Stories / Differences
Overall impact that "User Involvement" has on G2G User Adoption	User involvement increases likelihood of G2G adoption	
FURTHER EXPLANATION OF HOW "USER INVOLVEMENT" AFFECTS G2G USER ADOPTION		
Sub theme	Similarities	Unique Stories / Differences
Data Quality		User involvement in G2G can improve data quality of G2G, particularly where data is migrated from legacy systems. This is because users have intimate knowledge of their own data.
Skills	Users with correct skills must be involved to obtain accurate user requirements; G2G training is a form of user involvement and it builds skills in G2G;	Lack of availability of users with the correct skills impacts on whether users can be involved in G2G; Senior Management skills in IT can impact their involvement in G2G
Management Support	Involvement of management increases management support for G2G; Management must prioritise user involvement in G2G projects over the user's day-to-day business work	
Resistance	User involvement may reduce resistance from users; Users are involved and will have differing requirements, resulting in some users adopting the system and others resisting it;	Users may sometimes be reluctant to change despite being involved in G2G;
System Development Methodologies	Methodologies must identify correct users to be involved in G2G;	User involvement is also required after implementation of G2G, methodologies must ensure that the involvement is effective;
Main theme	Similarities	Unique Stories / Differences
Change Management	User involvement serves as a form of change management	User involvement may make users more understanding and less critical of G2G, when there are issues on the system;
Business Process Management	User involvement creates awareness of how the business processes will be changed by G2G; User involvement increases likelihood that G2G is aligned to how business processes work;	Existing business processes (not necessarily the processes implemented by G2G) may impact on G2G e.g. obtaining approvals; Involving too many users may pose a challenge to G2G if there are differing views on how business processes are to be implemented;

Figure 45. Summary of field data — How *User Involvement* affects Government-to-Government User Adoption

5.6 GOVERNMENT-TO-GOVERNMENT USER ADOPTION – *PRIORITY*

5.6.1 Overview

5.6.1.1 Overall impact: Relationships and influences

The implementation of a G2G system has to be given sufficient priority by the Department in order to improve the chances of the system being adopted by users. A summary of the field data evidence for the impact of *Priority* on User Adoption of G2G is shown in Figure 46. This is a summary graph showing whether interviewees supported, did not support or did not respond to *Priority* and the impact it has on User Adoption of G2G. It can therefore be seen that 12 out of 15 interviews provided evidence for *Priority* influencing User Adoption of G2G, i.e. giving G2G priority will improve user adoption of G2G. The remaining three interviewees did not provide a clear response.

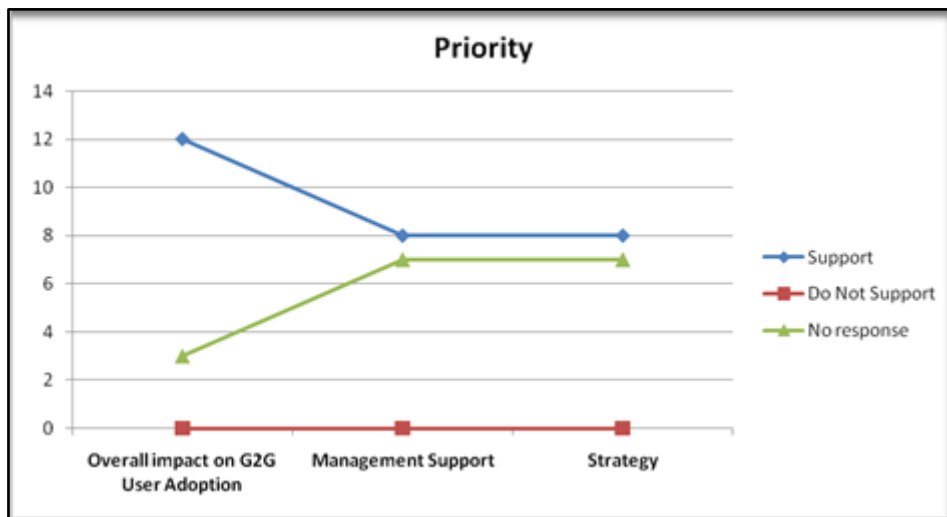


Figure 46. High-level view of interviewee responses — How *Priority* affects Government-to-Government User Adoption

Figure 46 also shows the existence of field data evidence for the relationships between *Priority* and the emergent themes and sub-themes. Two sub-themes (*management support* and *strategy*) have emanated from the field data. The identified themes and sub-themes are summarised in Figure 47. Each of these themes and sub-themes is discussed in relation to *Priority* in section 5.6.3, with field data evidence for the relationships also being presented.

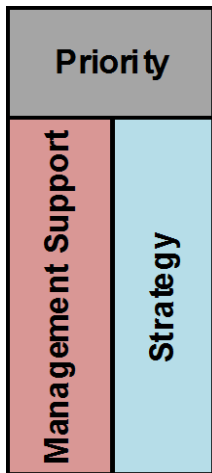


Figure 47. Sub-themes related to *Priority*

5.6.2 High-level view of interviewees' perspectives

Figure 48 presents the coding summary for *Priority* as evident in interview data and document analysis. The “References” column shows the number of references that the source made to *Priority*, whilst the “Coverage” column shows the percentage of the entire interview that made reference to *Priority*. The “Coverage” is also shown graphically in Figure 49, illustrating for instance that 40% of Jill’s interview yielded data relating to *Priority*.

The field data itself is discussed in detail in section 5.6.3 and summarised in section 5.6.4. Figure 48 and Figure 49 also show the importance or significance of *Priority* from the perspective of that particular interviewee at the time of the interview, since it shows the amount of time that the interview spent discussing the theme. It can therefore be seen that Jill, Ari and Kobus were the top three interviewees for whom *Priority* was the most important challenge facing User Adoption of G2G.

Name	In Folder	References	Coverage
Jill - JS - Interview Template 2	Internals\Interviews\Transcripts	12	40.90%
Billy - BA - Interview transcript	Internals\Interviews\Transcripts	7	8.21%
Ari - BA - Interview Template 2	Internals\Interviews\Transcripts	7	14.03%
Andre - AB - Interview transcript	Internals\Interviews\Transcripts	5	6.92%
Kobus - KB - Interview Template 2	Internals\Interviews\Transcripts	5	9.92%
Donna - DP - Template 2	Internals\Interviews\Transcripts	3	9.30%
Ria - RV - Interview transcript	Internals\Interviews\Transcripts	2	2.64%
Walter - WS - Interview transcript	Internals\Interviews\Transcripts	1	5.34%
Ron - RW - Interview transcript	Internals\Interviews\Transcripts	1	5.08%
Gerrie - GM - Interview transcript	Internals\Interviews\Transcripts	1	1.29%
Veronica - VA - Interview transcript	Internals\Interviews\Transcripts	1	2.37%

Figure 48. Field data coding summary — *Priority*

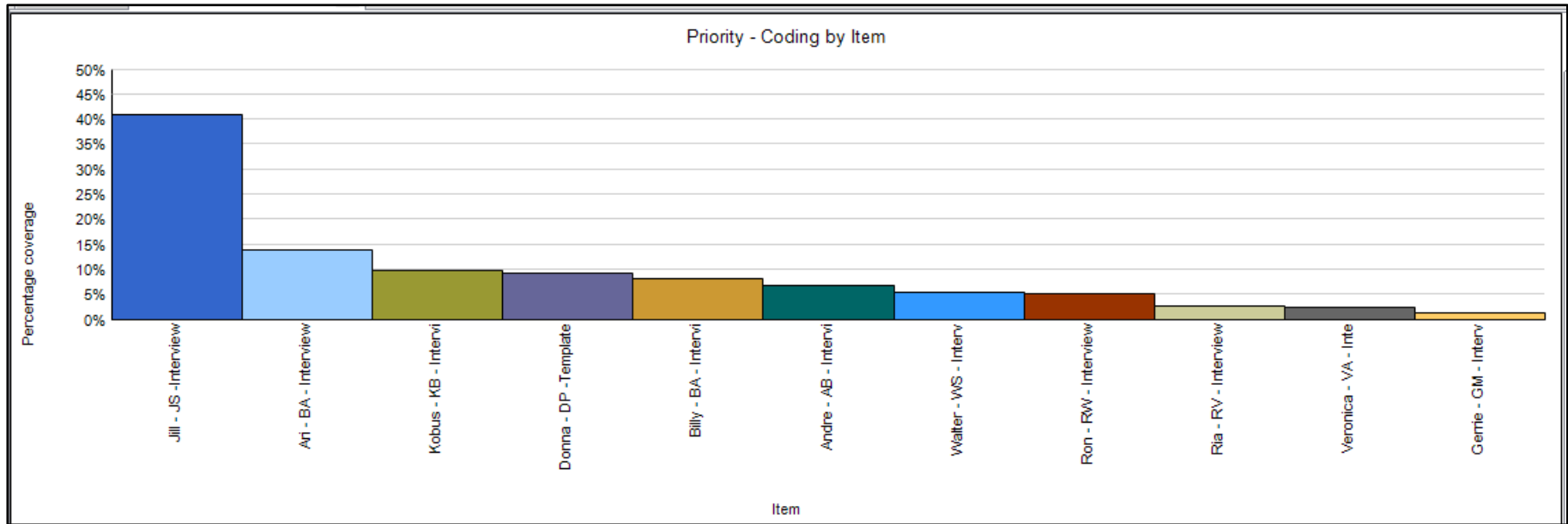


Figure 49. Field data coding chart — *Priority*

5.6.3 Narratives from field data — *Priority*

5.6.3.1 *Management support as a sub-theme*

The support from management for G2G projects is seen by some interviewees (eight out of the total of 15) as a critical contributor to the User Adoption of G2G and the success of G2G. One of the outcomes required from management support as mentioned by interviewees, is to provide buy-in and leadership support for the project. This in turn will improve the chances of the users of G2G supporting the project and committing to making it a success. According to Ron, *“Obtain the buy-in right from the top, the MEC and HOD level. And this will help people to commit and place it high up as a priority. Then you will really start getting things going. Right now it is seen as just some IT thing, but we do not realise that it can help transform the whole department and the way things are done.”*

Jill indicates that another reason why management support is so important is because Departmental staff involved in G2G projects need to continue with their day-to-day functions in addition to their involvement in the G2G project. It is not possible to hand over their day-to-day functions as there is no additional staff to hand over these functions to. Thus the G2G system is seen as an *“add on”* to their normal workloads, and management support is required to prioritise the G2G system over the normal day-to-day work.

According to Gerrie, management support is required to give G2G priority, ensuring that the G2G project has an adequate budget. He said, *“Budget is not determined by technical people. Management does not see it fit to apportion larger budgets to infrastructure.”*

Billy stated that someone from management needs to act as a *“driver”* for the G2G project. In his experience, the only projects that have been a success in the Department are those where there has been a *“driver”* steering and pioneering the project. In addition, in his view the lack of a *“driver”* is one of the biggest risks facing G2G. He defined a driver as someone who provides leadership and oversight at a project level, and improves the chances of the project being maintained as a priority on the agenda of other managers and executives. Billy described the need for the *“driver”* as being of utmost importance for those systems that will be used at decentralised sites in the Department. He stated that without the *“driver”*, the decentralised sites would not give the system adequate priority, as they have their own set of priorities. He also mentioned a case where there was no *“driver”* and a top-level manager at a decentralised site knew about a G2G system that was to be implemented and the rollout plan thereof, but failed to even mention this to the next level of managers as the G2G system was not seen as a priority.

One of the issues that management support seeks to address is to improve the chances of co-ordination and collaboration taking place when there are multiple stakeholders involved. Andre referred to system owners *“having their own agendas or wanting to protect their turf”*. This results in a lack of co-operation when it comes to the implementation of G2G and management support is required to overcome such hurdles. Similarly, management support is required to improve the chances of successful engagement where there is cross-departmental collaboration required. According to Andre, *“getting co-operation across departments is very difficult due to different priorities. If one of the parties is not getting something out of the system, you can count on the fact that you are not going to get their commitment to get the G2G system off the ground. They don’t have anything to gain from it.”* Thus management support is required to give G2G priority for different stakeholders, whether within the Department or in different departments. This in turn affects the successful adoption of G2G.

Veronica stated that in order for management to support G2G, they need to be educated about technology. She mentioned that management relies on the users to provide the direction, whereas this should come from the top. According to her, *“If management does not know the direction, and users do not know as well then we end up running in circles.”* Jill shared a similar view and indicated that there is a lack of awareness at a management level, coupled with a lack of understanding of what e-Gov is. She echoed Veronica’s sentiments as she indicated that *“you have lower level people running the projects”*, and believed that management must provide information on what the aims and objectives of the G2G system should be and how they should be achieved.

Kobus mentioned that support from management is linked to politics, as the administration in a government department *“is politically driven and changes every five years”*. In his experience, managers may support an initiative but this could change when a new administration comes in as there are different priorities. He said that *“they will take ownership of a project or initiative as long as it serves their purpose”*, and when administration changes *“there is often a discrepancy between what has already been developed”* and what the new administration requires from e-Gov. A further point mentioned by Kobus is that *“people are vying to express their authority which can impose on the project”*. Thus management support for e-Gov is affected by different drivers.

5.6.3.2 Strategy as a sub-theme

The need for an e-Gov strategy has been highlighted as important to set the strategic foundation for the Department and to improve the chances of e-Gov being given the right level of priority. Interviewees believe that this strategy is lacking, and according to Andre, the strategy needs to be *“something that is simple and meaningful and realistic. Not high-level and idealistic. This will set*

the tone and direction. We should have some timelines, and measurables that must be achieved". Walter also highlighted the need for an incremental strategy that will *"take things in bite-sized chunks instead of a big bang. Focus on the most critical requirements for the department, and show some quick wins"*. Ari indicated that the strategy should provide priority and direction as there is *"a lack of a culture of excellence"*, whilst Jill said that what has been done to date *"is more face-value stuff, more can be done"*, emphasising the need for a strategy to provide direction for the future of e-Gov in the Department.

Jill indicated that the strategy must position ICT appropriately in the Department, as it has been *"misunderstood as desktop support"*. She also mentioned that previous strategies have emphasised the implementation of technology infrastructure such as networks, without making adequate provision for the systems as part of the strategy. Thus, *"there is a waste of money, you upgrade the infrastructure and the systems are not coming"*. She added that since the systems are not in place on time, the infrastructure *"is now out of date"*. Kobus said that *"it is a non-commercial environment and profit motives are not there to drive efficiency. It is a lot more lax about efficiency, delivery and performance"*. Thus it would seem that the strategy must improve the chances of the importance of ICT and e-Gov, in particular, being established in the Department with clear accountability and performance metrics. The strategy should also strike a balance between technology infrastructure required to support the e-Gov systems and the implementation of the system itself.

The strategy must consider and respond to the time that it takes to get systems projects approved, off the ground and implemented in the Department. A related challenge highlighted by interviewees is that procurement takes a long time and has an impact on the project. Andre described a case where *"it took us about two years to get an ECM supplier on board"*. Billy mentioned an example of another system that had been in the pipeline for 20 years and had still not been implemented. He indicated that when a system takes too long to implement, you lose momentum and support, and you fail to reap the benefits that the G2G system should bring to the Department. According to Donna, departments lose the budget that was available for the system as *"it takes time to process and it's just too slow"*. Walter suggested that there is a need to invest in platform-type system solutions that can be used for several purposes. This could possibly reduce the time taken to implement systems since *"We don't need to each time start from scratch and we can provide quicker turnaround times, maybe have systems up in months instead of years"*.

According to Ria, the e-Gov strategy should introduce some type of oversight body that is responsible for providing strategic direction and setting the priority for e-Gov across the province. This body will *"force government departments to co-operate with each other for the greater good of the province and government. This body should be able to make trade-off decisions and set*

priorities”. Billy indicated that the Department is working in silos in their individual business units; similarly, other government departments in the province are also working in their own silos. The oversight body will help to reduce some of the silo mentality, by at least providing a platform to share ideas and create awareness of what is going on with regards to e-Gov in different departments in the province. According to Jill, the KZN Provincial Government Information Technology Officers Council (PGITOC — an ICT governance body comprising representatives from all the KZN provincial government departments) should play a role in providing a strategy for e-Gov. However, she cited some of the challenges facing PGITOC as follows: the inadequacy of ICT skills in PGITOC, the lack of capacity of PGITOC to get involved in national forums, the lack of empowerment of the PGITOC to make and effect decisions in the departments, and an inability to obtain consensus from the different government departments. According to Jill, “*that means that your decision makers around IT are not actually IT people*”. Jill also mentioned partnerships between the government departments and the Auditor-General (oversight body responsible for external auditing of government departments, including ICT audits) in order to give systems implementation a higher priority. Kobus shared the view that the Auditor-General has assisted in improving the Department’s prioritisation of e-Gov initiatives, by focusing on the value that is delivered from ICT projects as part of audits.

5.6.4 Summary of field data

The field data related to the impact that *Priority* has on G2G User Adoption is summarised in Figure 50.

How "Priority" affects G2G User Adoption		
OVERALL IMPACT		
Overall impact	Similarities	Unique Stories / Differences
Overall impact that "Priority" has on G2G User Adoption	G2G must be given appropriate level of priority to ensure that the system is successfully adopted by users	
FURTHER EXPLANATION OF HOW "PRIORITY" AFFECTS G2G USER ADOPTION		
Sub theme	Similarities	Unique Stories / Differences
Management Support	Management support is needed to obtain the buy-in from users; Management should ensure that the G2G project is given adequate priority	Management must help prioritise G2G in relation to current staff workloads; There is a need for management to serve as a driver of G2G; Management must ensure co-operation within the department and across different departments; Management must be upskilled to provide support; Management support may be politically driven as the administration in government changes every 5 years;
Strategy	An e-Government strategy for the Department is lacking at present, and this is a key requirement; The strategy sets the foundation of e-Gov and G2G; The strategy must establish the importance of IT and e-Gov in the Department;	Strategy must make consideration for lengthy processes which impact on G2G projects; Strategy should introduce an oversight body responsible for e-Gov across the province.

Figure 50. Summary of field data — How *Priority* affects Government-to-Government User Adoption

5.7 GOVERNMENT-TO-GOVERNMENT USER ADOPTION – *ORGANISATIONAL CULTURE*

5.7.1 Overview

5.7.1.1 Overall impact: Relationships and influences

The field data has shown that the organisational culture of the Department affects the adoption of G2G. If the culture is open to changes and embraces technology, then G2G is likely to be adopted. A summary of field data evidence for the impact of *Organisational Culture* on User Adoption of G2G is shown in Figure 51. This is a summary graph showing whether interviewees supported, did not support or did not respond to *Organisational Culture* and the impact it has on User Adoption of G2G. It can be seen that 11 out of 15 interviews provided evidence for *Organisational Culture* influencing User Adoption of G2G, i.e. a conducive organisational culture will improve the likelihood of user adoption of G2G. The remaining four interviewees did not provide a clear response.

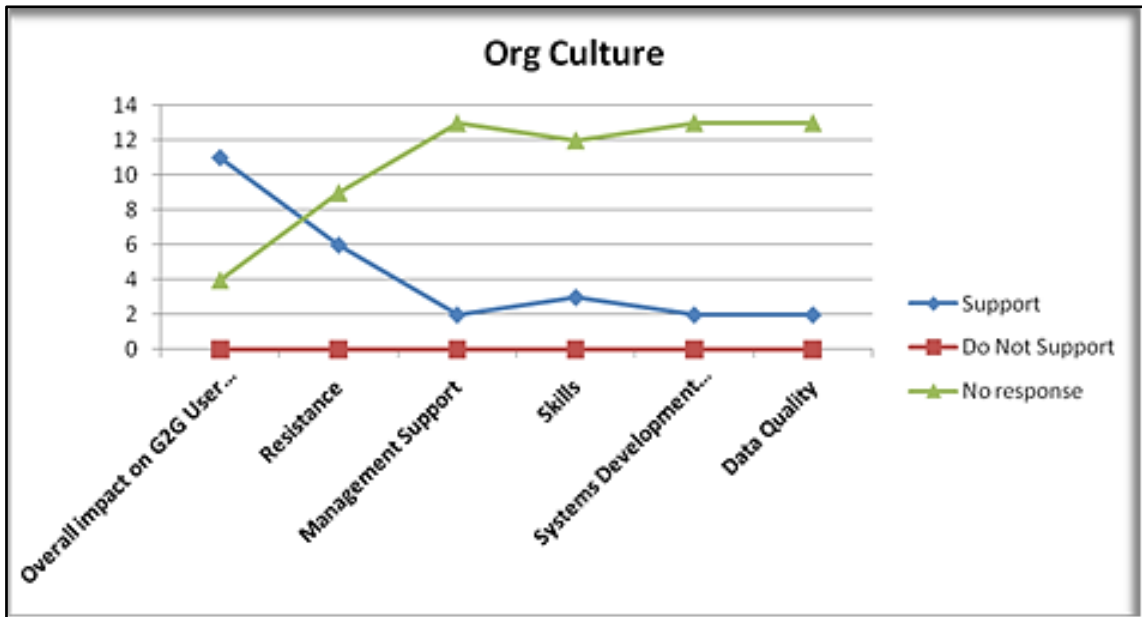


Figure 51. High-level view of interviewee responses — How *Organisational Culture* affects Government-to-Government User Adoption

Figure 51 shows the existence of field data evidence for the relationships between *Organisational Culture* and the emergent themes and sub-themes. Five sub-themes (*HR skills*, *resistance*, *systems development methodology*, *management support* and *data quality*) have emanated from the field data. The identified themes and sub-themes are summarised in Figure 52. Each of these themes and sub-themes is discussed in relation to *Organisational Culture* in section 5.7.3, with field data evidence for the relationships also being presented.

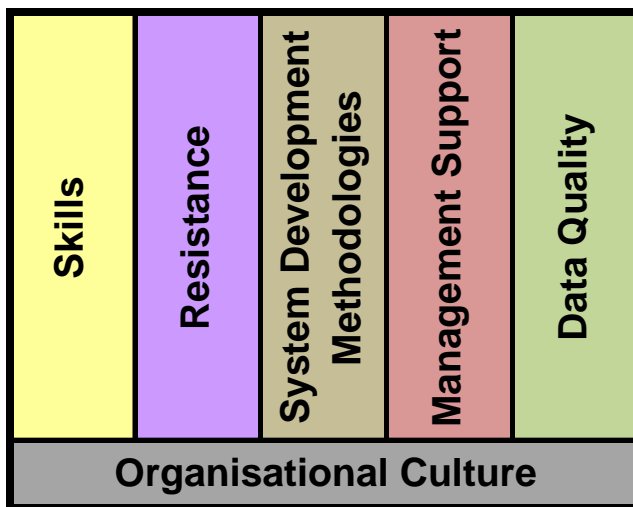


Figure 52. Themes and sub-themes related to *Organisational Culture*

5.7.2 High-level view of interviewees' perspectives

Figure 53 presents the coding summary for *Organisational Culture* as evident in the interview data and document analysis. The “References” column shows the number of references that the source made to *Organisational Culture*, whilst the “Coverage” column shows the percentage of the entire interview that made reference to *Organisational Culture*. The “Coverage” is also shown graphically in Figure 54, illustrating for instance that 17% of Bernice’s interview yielded data relating to *Organisational Culture*.

The field data itself is discussed in detail in section 5.7.3 and summarised in section 5.7.4. Figure 53 and Figure 54 also show the importance or significance of *Organisational Culture* from the perspective of that particular interviewee at the time of the interview, since it shows the amount of time that the interview spent discussing the theme. It can therefore be seen that Bernice, Billy and Ari were the top three interviewees for whom *Organisational Culture* was the most important challenge facing User Adoption of G2G.

Name	In Folder	References	Coverage
Billy - BA - Interview transcript	Internals\Interviews\Transcripts	5	16.56%
Ria - RV - Interview transcript	Internals\Interviews\Transcripts	4	6.85%
Joe - JN - Interview transcript	Internals\Interviews\Transcripts	3	8.37%
Kasturi - KG - Template 2	Internals\Interviews\Transcripts	3	10.19%
Ari - BA - Interview Template 2	Internals\Interviews\Transcripts	3	14.14%
Ron - RW - Interview transcript	Internals\Interviews\Transcripts	2	8.69%
Bernice - BN - Interview Template 2	Internals\Interviews\Transcripts	2	17.18%
Jill - JS - Interview Template 2	Internals\Interviews\Transcripts	2	7.83%
Gerrie - GM - Interview transcript	Internals\Interviews\Transcripts	1	3.75%
Veronica - VA - Interview transcript	Internals\Interviews\Transcripts	1	2.67%

Figure 53. Field data coding summary — *Organisational Culture*

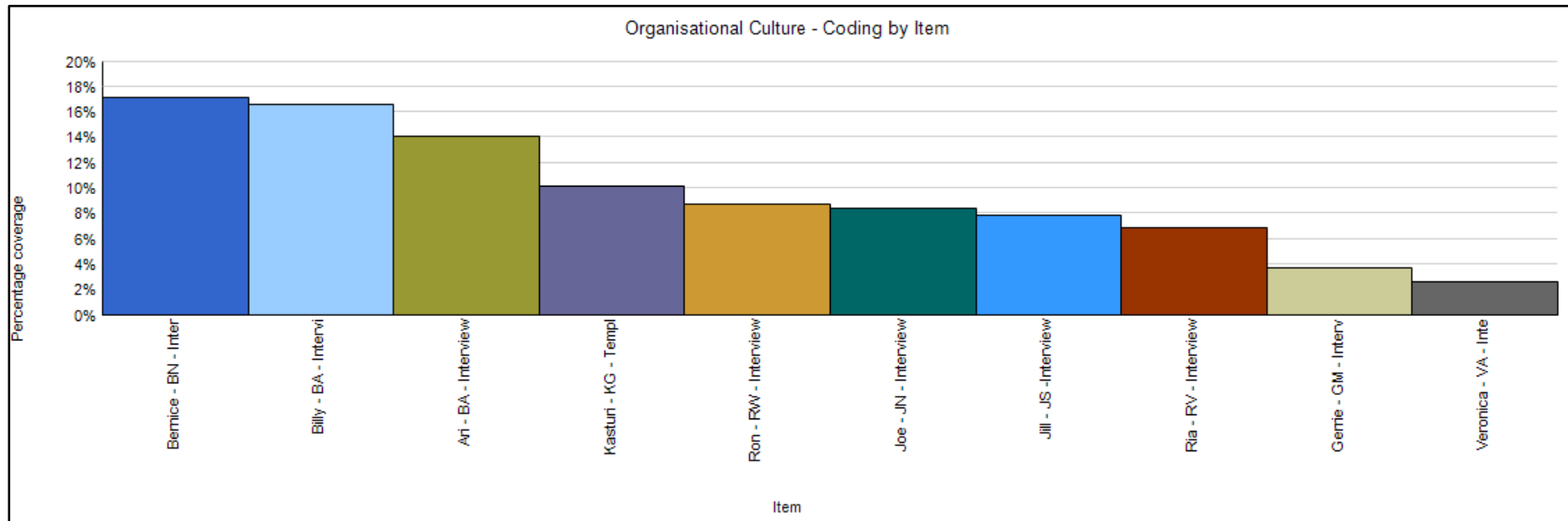


Figure 54. Field data coding chart — *Organisational Culture*

5.7.3 Narratives from field data – *Organisational Culture*

5.7.3.1 *Human resources skills as a sub-theme*

Billy mentioned *skills* having an influence on *Organisational Culture*. He mentioned having conducted several training interventions for users at decentralised sites in order to upskill them and get them to use the G2G systems. However, these interventions had proved futile and the users still refused to use the system. He indicated that “*even after the training, still they have no clue and there is reluctance to use it*”. According to him, the reluctance to use the system was due to the organisational culture, in the context of which the users had become used to not using the systems without any consequences. Hence, the training interventions to upskill users had not been beneficial.

According to Jill, the culture in the Department has been to conduct training only at implementation stage, “*but no further formal training sessions [are conducted] unless it is done in-house. The first batch is trained and then the newcomers are not trained. Whoever was there before will need to train the new staff*”. Jill believed that this lack of training affects the adoption of G2G.

Another dimension related to *skills* influencing *Organisational Culture*, according to Billy, is that if there is a lack of capacity and inadequate staff, then this contributes to a culture that is reluctant to embrace G2G systems. He mentioned that he strongly believed that the culture that had emerged was due to a lack of capacity, and he had therefore motivated for additional posts to be added on to the organisational structure to address this issue. There should have been dedicated staff that would drive the use of the G2G systems, particularly in decentralised sites. Even though these posts were approved, they were never filled and “*the duties have since been hijacked*” with the posts being used for other purposes.

Ari described staff turnover as affecting G2G. He indicated that without system support staff in the Department, users are not given the support they need and will eventually stop using the system. He described the cultural aspects related to staff turnover: “*Nowadays someone new must hit the ground running. In a mature environment there are processes and documentation to assist the new person and it’s OK. But we don’t have all of that in place. Also what happens when things don’t go according to plan? Then you need good skills to cope with the situation. In the less mature environments like ours, people are more critical as everything is in their heads.*” Thus, the *Organisational Culture* that has developed in the Department around staff turnover affects G2G.

5.7.3.2 *Resistance as a sub-theme*

The interviewees indicated that users may resist using a G2G system, due to the culture of the organisation. According to Joe, when users are “*comfortable in a particular setting*”, they do not want to start using a new system and this is one aspect of *Organisational Culture*. He mentioned an example where previously paper documents had been manually retrieved from the archives, and now users had to scan the documents into the system and then retrieve them electronically when needed. The users did not want to do that as they were used to the “*old way of doing things*”.

Billy also mentioned an example where there was *resistance* due to *Organisational Culture*. He described two separate examples where the users from decentralised sites had become used to telephoning or calling in at Head Office when they needed to get something done on the system, and refused to use the system even though they had access to it themselves. Billy said with reference to a G2G system: “*It’s not used in the regions, they just phone myself or Mary. It’s easier to make it someone else’s responsibility. Phone Billy or Mary, why should I take control of the system*”. Veronica stated that *resistance* also occurs because there is little motivation to learn, and if there is a problem with the system then users will stop working instead of trying to find alternative ways of working or assisting with solving the problem. As she put it: “*If there is a problem then that’s it. Work comes to a halt. They will wait for you to sort it out. It’s a problem in government per se*”. The example mentioned by Veronica has some similarities to that provided by Billy, where the culture is described as one that passes the responsibility to perform system functions on to someone else. Therefore this becomes a form of user *resistance* to the system.

Kasturi said that there is a culture of “*decisions being made at the top or the senior level of the organisation, with the failure of understanding that the actual people that are going to be using the system or implementing all the changes are the resources under them*”. She indicated that there is no “*proper engagement*” and that the changes are “*basically forced from top-down without actually informing all the levels within the organisation*”. This aspect of culture makes it difficult to get buy-in from the users and hence affects the adoption of G2G.

Nontobeko described *resistance* as something that may originate based on individual users’ experience and eventually develops into an *Organisational Culture* issue. She indicated that “*people talk amongst themselves and you find that one person will tell another person about their negative experience on the system, and soon the whole section will end up being against the system*”. Ari also described similar experiences and believed that it is due to a culture of “*things happening in isolation and lack of communication*”. He said that this will “*affect user adoption as*

there is then a negative perception created of the system when things go wrong and system issues crop up”.

Ron offered a possible solution to user *resistance*. He indicated that if there is resistance due to the culture, then *Change Management* is required to overcome resistance and change the culture. He stated: *“If there are issues related to culture, as part of change management you need to identify what are those issues.”* Bernice described an example where there was a lack of change management in a G2G implementation and this created a culture of resistance in the business unit, where users *“perceived the system as extra work and that it was quicker to do things manually than on the system. They did not fully understand the value in the long run”*. She mentioned that it took a while for users to eventually start using the system effectively and said that *“attitude and mind-set is first and foremost. You can get the skills but you need the right attitude as well”*.

5.7.3.3 Systems development methodology as a sub-theme

Gerrie indicated that the *Organisational Culture* can have an impact on the effectiveness of the *systems development methodology* used. According to him, if the culture is one that encourages meaningful participation by users in the systems development life cycle, then this *“affects the quality of the information produced by the system and the quality of the requirements provided”*.

Ria also held a similar view and maintained that when the processes related to systems implementation *“are more established and ingrained, you find that things work more efficiently”*. She indicated that if the systems implementation processes become institutionalised and part of the organisational culture, then the outcomes of these processes are more likely to be successful. In contrast, if the systems implementation processes are new or ad-hoc, then the likelihood of these processes producing successful outcomes could be reduced.

5.7.3.4 Management support as a sub-theme

According to Billy, support from management for G2G system implementation must be part of the culture of the organisation. This will improve the chances of management placing G2G systems implementation high up on their list of priorities and also improves the chances of the constructive involvement of management contributing to the overall adoption of G2G. In addition, he indicated that management support is required to overcome user resistance that has developed over time and become a cultural issue. He mentions an example where the management support was lacking, with undesirable consequences. He stated: *“People are not interested in the reporting system whatsoever, there is not a thing done. It’s the culture, the reporting is not important. Nobody is*

driving it to see that they are doing what they need to do, even the managers do not see that it is done.”

Kasturi described a culture where there is a lack of *“understanding of IT from an executive or senior management level”*. She said that *“as long as they’ve got a PC on their desk they think that’s all, but they don’t understand what goes into providing that service to them”*. Kasturi believed that there is a need for management to understand the *“importance of IT being aligned to the business to bring about efficiencies within the organisation”* in order to prevent challenges related to *“user requirements for systems or solutions within government”*. Thus, the *Organisational Culture* is affected by management attitude and understanding of ICT, which in turn affects G2G.

5.7.3.5 Data quality as a sub-theme

Gerrie mentioned that Organisational Culture affects user discipline when it comes to using G2G. He distinguished between a service culture driven by a need to deliver services to citizens, and a political culture driven by a need to meet political agendas. He mentioned that *“if it is a service type of culture you find users are more disciplined but if it is a political culture, as most Departments are these days, then user discipline is low”*. He added that this discipline will affect the quality of data produced by the system. He used the phrase *“garbage in, garbage out”* to highlight that if users are using the system correctly, capturing data on time and ensuring the accuracy of the data input, then the overall reports and data produced by the system will be of a high quality. He cautioned that *“there are major consequences down the line for information quality”*.

Jill shared Gerrie’s view on the significance of data quality and commented that *“because you are relying on the data for management decisions, it must be planned out. If you don’t do this you run into problems”*. She believed that the data quality issues are related to a culture of lack of governance across government and *“an approach of government in the past, every man for himself”*. This has resulted in the duplication of systems in government and *“means that data is invalid and you cannot reconcile between systems”*.

5.7.4 Summary of field data

The field data related to the impact that *Organisational Culture* has on G2G User Adoption is summarised in Figure 55.

How "Organisational Culture" affects G2G User Adoption		
OVERALL IMPACT		
Overall impact	Similarities	Unique Stories / Differences
Overall impact that "Organisational Culture" has on G2G User Adoption	If organisational culture is open to changes and embraces technology, then G2G adoption will be higher.	
FURTHER EXPLANATION OF HOW "ORGANISATIONAL CULTURE" AFFECTS G2G USER ADOPTION		
Sub theme	Similarities	Unique Stories / Differences
Data Quality	Organisational culture affects user discipline on G2G use, which in turn affects the quality of data produced by G2G	
Resistance	The organisational culture can result in resistance to G2G; Individual's users experience of G2G may develop into a culture around G2G;	Culture of making decisions at the top without involving end users can result in resistance;
Management Support	Support from management for G2G must be established as part of the organisation's culture. This ensure effective management support.	Organisational culture is affected by management understanding of IT and attitude towards IT, this in turn affects the adoption of G2G;
Skills	Lack of adequate capacity and skills has created a culture of reluctance of use G2G, as well as culture of heavy reliance on specific individuals involved in G2G	An organisational culture has developed where users do not use G2G, as there are no consequences for non-use; The culture is to train for G2G only at implementation, and not thereafter;
Systems Development Methodology	Culture of meaningful participation in systems development and implementation results in higher user adoption;	

Figure 55. Summary of field data — How *Organisational Culture* affects Government-to-Government User Adoption

5.8 TECHNOLOGY INFRASTRUCTURE

Technology Infrastructure in itself has been seen as a less important challenge in the field data as compared to the other research questions involving the User Adoption, HR Skills and Complexity challenges to G2G. This means that whilst interviewees believed technology infrastructure does affect G2G, there was a clear understanding of what the issues are around technology infrastructure itself, and what solutions are required to address the issues. However, interviewees believed at the same time that there are issues underlying technology infrastructure that are problematic. The findings from the field data are discussed below.

5.8.1 Availability of technical infrastructure

Three out of the 15 interviewees believed that the technical infrastructure within the Department is adequate for G2G systems and does not pose significant challenges. Ari stated that *"PCs are not a problem, and the server infrastructure is flexible with virtualisation"*. Similarly, Jill stated that

“PCs are decent”, and Joe said “our computers are fine, we replace them when needed”. Ron also indicated that “we are generally up to speed with our computers and servers”.

At the same time, the remaining 12 interviewees believed the availability of technical infrastructure does pose a challenge to G2G. For instance, Billy described the lack of adequate PCs, or out of date PCs, in regional offices. The impact of this is that *“the guys use the system, it starts to hang and they eventually stop using it”*. Similarly, Bernice mentioned that *“they can’t log on in the rural areas and they are not providing consistent levels of service. They complain about the system but it’s the infrastructure”*.

All 15 interviewees described various underlying issues related to the availability of technical infrastructure, which are discussed further in section 5.8.5.1.

5.8.2 Access to Internet

Jill was the only interviewee who mentioned access to the Internet as a challenge; she indicated that *“it is a problem in the rural areas”*. In contrast, Ria and Nontobeko both felt that access to the Internet is not a problem. Nontobeko elaborated by mentioning that access to the Internet is usually established up front: *“no use in building web-based systems when users cannot access the web”*. The remaining 12 interviewees did not comment on whether access to the Internet is a challenge.

5.8.3 Government networks

All 15 interviewees as well as the Position Paper on IT systems in KZN DoT (KZN DoT, 2013b) indicated that the bandwidth available in the Wide Area Network (WAN) is the most important issue related to Technology Infrastructure. Nine out of the 15 interviewees, as well as the Position Paper on IT systems in KZN DoT (KZN DoT, 2013b), then stated that the solution to the bandwidth challenge is to upgrade the bandwidth to the required level. The remaining six interviewees did not comment on the solution required to address bandwidth challenges. Field data has, however, also shown that the cost of upgrading the bandwidth is a prohibitive factor (Gerrie, Ron, Walter, Ari, Donna, Jill and Kasturi).

All 15 interviewees described various underlying issues related to government networks, which is discussed further in section 5.8.5.2.

5.8.4 Summary of findings

A summary of the interviewees who believed that availability of technical infrastructure, government networks and Internet access pose challenges to G2G are shown in Figure 56.

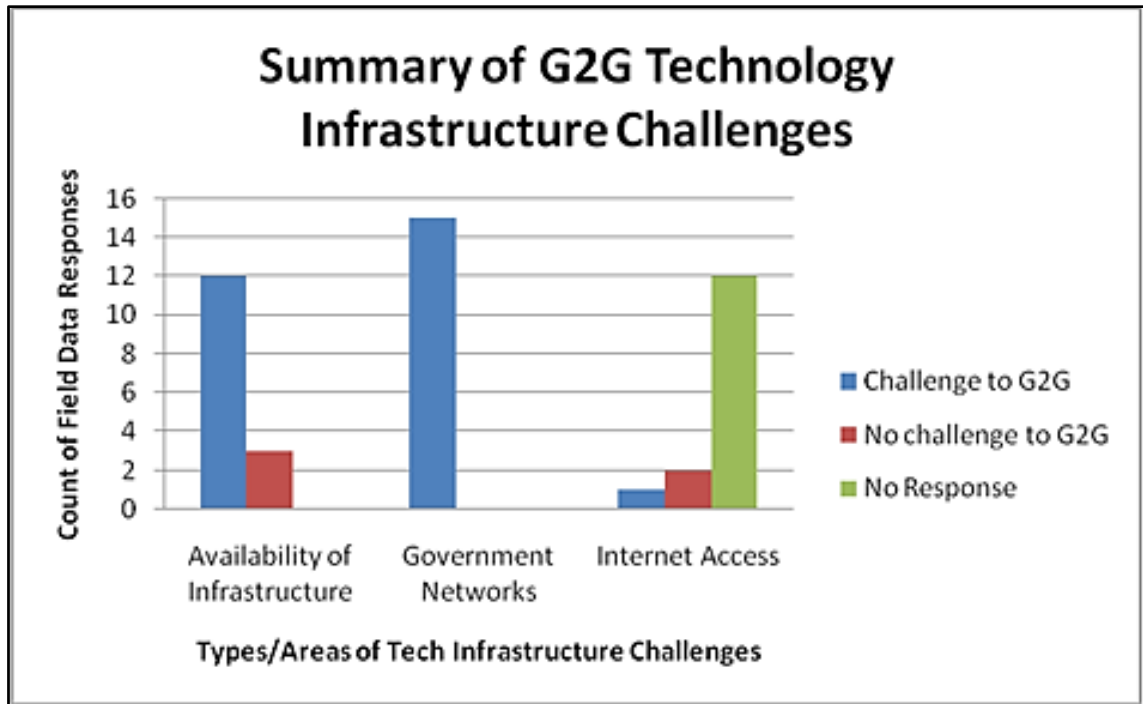


Figure 56. Field data evidence for *Technology Infrastructure* challenges of Government-to-Government

5.8.5 *Technology Infrastructure* supporting sub-themes of User Adoption

As mentioned above, the field data has shown that Technology Infrastructure in itself is seen as a less important challenge facing G2G. In addition, the field data did not provide adequate evidence for Technology Infrastructure influencing User Adoption or any of the User Adoption main themes (i.e. *Change Management, Business Process Management, User Involvement, Addressing User Requirements, Organisational Culture* or *Priority*). Thus, unlike the research questions related to HR Skills and Complexity, it cannot be concluded from the field data that Technology Infrastructure has an impact on User Adoption.

The challenge around technical infrastructure is that there is not enough infrastructure, whilst the challenge around government networks is that the bandwidth is insufficient. The solution to the former is that more infrastructure must be purchased and put in place, whilst in the case of the latter the bandwidth must be upgraded. The field data has, however, shown that there are underlying issues related to Technology Infrastructure that prevent these solutions from being easily put in place. These underlying issues as described by the interviewees can be mapped back

to, and hence provide support for, the sub-themes of User Adoption. Figure 57 summarises the relationships that emerged from the field data between Technology Infrastructure main themes and G2G User Adoption sub-themes. The findings are thereafter discussed in detail.

		G2G User Adoption Sub Themes							
		Strategy	Usability	Complexity	Resistance	System development methodologies	Management Support	HR Skills	Data Quality
Technology Infrastructure Main Themes	Availability of technical infrastructure	x	x		x	x	x	x	
	Government Networks	x	x		x	x	x	x	

Figure 57. Summary mapping of *Technology Infrastructure* themes to Government-to-Government User Adoption sub-themes

5.8.5.1. Narratives from field data — Availability of *Technology Infrastructure* related to Government-to-Government User Adoption sub-themes

Relationship to the strategy sub-theme

Gerrie indicated that planning for implementation of *strategy* must be adequately done to acquire the technical infrastructure needed for G2G. He believed that “*it’s just sheer numbers, which comes to how many we need, the licensing costs which rolls up to the total costs. And then the lack of availability of budget, to buy and then to also maintain the infrastructure and train staff*”. Similarly, Nontobeko believed that “*the infrastructure is outdated*” and pointed out that planning for infrastructure must take place early on in a project, because “*if you need to buy new infrastructure during the course of the project then this delays implementation*”. Kobus agreed with this view and mentioned that planning “*must be given priority in terms of time to do the specifications and to allocate budget. Currently the view is that you have to spend on hardware only when things are falling over, if it’s not falling over then they feel you can get by*”.

According to Walter, there is a need for a strategy formulation to look into “*newer technologies like tablets and mobile devices. And capitalise on this. Also look at using newer technologies like cloud computing*”. He believed that “*we are too slow to respond as the industry progresses, so we get left behind*”. Whilst Ari believed that there is a need to move towards newer technologies like “*cloud and renting infrastructure*”, he cautioned that this cannot be looked at until “*you sort out the bandwidth*”. Thus, there appears to be dependencies between moving onto newer technical infrastructure and government network capabilities.

As part of the planning for implementation of G2G, Bernice mentioned that end-user devices need to be considered. In particular she states that “*the versions of PC and browsers will affect the user*

experience". She believed that there is a need for clients to *"standardise on the workstations and servers"*. Donna, however, indicated that there has been some progress in this regard and that *"PC upgrades are being done, there is a minimum spec and they upgrade the PCs as the spec changes"*. Donna also mentioned that another reason for the upgrading of PCs is that *"you find that there is a life cycle to a PC, some applications won't run on the older PCs so they have to upgrade the PCs"*.

Kasturi indicated that over the previous two years there had been a focus on upgrading technical infrastructure in the Department and that *"we've been successful to a certain extent in terms of getting our servers and storage etc. upgraded but the other challenge that we find as well even with upgrading, three to five years later you have to look at an upgrade again as it is now outdated"*. She mentioned that the cost escalates over time and that there is a need for formulating a strategy addressing *"a hub, most probably Dube TradePort or within the SITA environment, where you can have all your infrastructure hosted there because of the budget constraints within government. You pay a fee but you know that upgrades take place timeously as well."* Thus, the strategy for technical infrastructure needs to improve the chances of infrastructural upgrades being done in an economical manner with provisions for such upgrades to be done on time.

Kasturi also mentioned the need to conduct capacity planning for infrastructure such as PCs. She pointed out that purchasing of PCs *"doesn't take place in an efficient manner because the budget for PCs is decentralised within the regions, so basically when you're getting a requirement through from the regions the responsibility managers are not assessing to determine whether there's a real need for that PC"*. She commented that spending on PCs unnecessarily can be avoided with better planning, since you may find that *"PCs are not optimally utilised"*, and that when you purchase a PC, other costs like licensing of PC software add to the total cost of the infrastructure. It would therefore seem that a strategy is required to assess rigorously the need for technical infrastructure and efficiently plan for such infrastructure requirements.

A final strategic requirement highlighted by Kasturi was the need for *"new tools to manage the technical operations environment"*. Andre supported this view and agreed that the technical support team must have tools to assist them. Kasturi provided examples of tools that can be used to monitor servers, proactively identify and address problems on technical infrastructure, and to deploy security patches to PCs automatically. She believed, however, that management does not understand the need for such tools and that *"they don't know that by actually purchasing a tool it will have value in the long run in terms of managing that environment"*.

Relationship to the usability sub-theme

Walter mentioned that newer technical infrastructure solutions must be investigated to enhance the usability of G2G systems. He indicated that tablets and mobile devices would allow G2G systems to be “*accessed from anywhere*”. Similarly, Donna believed that the versions of PCs “*will affect the user experience*”.

Relationship to the resistance sub-theme

The KZN DoT IT Systems Position Paper (KZN DoT, 2013b: 8) mentions systems that users have stopped using “partly due to network and hardware problems”. The document further explains the impact of the lack of system use, which “results in skewed data”. Veronica expressed a similar point of view based on her experience: “*I think there is a problem on the live server. It’s not just the network. Because e-mails to other sites work OK, so how come it’s just the system that is so slow?*” She described the impact that technical infrastructure issues have on system use: “*We have had so many problems in the past, people have lost interest. There is a very negative perception.*” It would therefore seem that Technology Infrastructure issues have contributed to users’ lack of system utilisation.

Relationship to the systems development methodology sub-theme

Andre described the need for the systems development methodology to “*ensure that the G2G system is optimised in every conceivable way from a design and development point of view*”, so that negative impacts on the technical infrastructure and the network are minimised. He described an example of a G2G system that was designed to “*synchronise to the main server after hours when the traffic was lower on the network. This was mainly because we anticipate that users will be uploading and downloading large files on the system and this will affect the system performance*”.

Another systems development methodology issue described by Andre was the following: “*We don’t have enough test infrastructure to test effectively. I think in general the production environments are given due consideration, but development and test environments are just an afterthought.*” He added that “*this is partially the cause of some of our performance problems. The development and test environments are nothing like production. Or you test on a server in the next room, and in production your users are accessing the system from across a limited network hundreds of kilometres away*”. Therefore, the methodology used for systems development should improve the chances of the G2G test environment being comparable to the live environment in which the system will be deployed.

Nontobeko mentioned the need for the systems development methodology to incorporate planning for the technical infrastructure needs of the G2G system. She mentioned that *“we need to be more thorough in actually looking into the whole technical infrastructure requirements at an early stage in the project. If there are any issues then there should be plans to address. The real issue is that we leave the technical infrastructure to the end when it is too late, and that’s when the delays happen and other issues start to crop up. E.g. if you buy a new server for go-live and the system does not work well on that platform. That’s why I say planning upfront is important”*. This view was shared by Kobus, who indicated that the system and its implementation costs are considered first, and *“then you think about hardware”*. He believed that *“it is a key dependency that is left too late”*.

Relationship to the management support sub-theme

Jill indicated that the upgrading of PCs is a manager’s decision and that *“they are penny pinching”*. As a consequence some users *“are running ancient machines”* that affect their ability to use G2G systems effectively. Thus, *management support* is required to improve the chances of the Technology Infrastructure requirements of G2G being adequate.

Relationship to the HR skills sub-theme

Nontobeko highlighted PC literacy as a problem and believed that *“sometimes it is actually more of a problem than the actual PC itself”*. Ari provided another view on skills and pointed out the lack of adequate technical skills to support the technical infrastructure. He believed that *“There is a shortage of high level skills. E.g. server resources, there is a high turnover of server skills. We are losing skills as the salaries in KZN are lower than JHB or Cape Town”*. Donna believed that incorrect specifications for technical infrastructure lead to the infrastructure being acquired but being unable to support the requirements of the G2G system. She believed that *“it comes back to the lack of skills when doing the specs”*. Thus, there are a number of different *skills* required to support the Technology Infrastructure requirements of G2G.

5.8.5.2. Narratives from field data — government networks related to Government-to-Government User Adoption sub-themes

Relationship to the strategy sub-theme

Andre mentioned that *“network management is not always good”* and that there may be underlying issues related to government networks that must be investigated. He indicated that *“currently the de facto answer is to up the bandwidth; however, there needs to be a detailed analysis of the current network to determine what is the current state and to sort out any existing*

issues. *Then optimise the current network and where required look at increasing the bandwidth*". Andre also believed that departments have invested in *"bandwidth optimisers and compression devices but these do not work the way they should"*. He questioned whether such devices have been implemented correctly and also mentioned that *"Quality of Service (QOS) is not implemented on all sites so you find a lot of bandwidth gets wasted on personal things like videos and music instead of for system usage"*. It therefore seems that the strategy for government networks needs to investigate whether there are current issues that prevent networks from operating optimally. The strategy should also look at optimal utilisation of tools (such as compression, QOS and bandwidth optimisation devices) that could potentially optimise existing networks.

Gerrie believed that there is a need for more robust planning around networks and indicated that *"there is not enough planning when it comes to infrastructure. Planning is left up to people who don't understand planning to start with. And the problems manifest after implementation only"*. To this end Nontobeko also mentioned that there have been instances where G2G systems are expected to be used at new Departmental offices that do not have any network connectivity. The lack of network connectivity only becomes apparent in the latter stages of the project and delays the system's implementation.

According to Kasturi, there is a need to increase the bandwidth in the Department to be able to cater for G2G systems. However, she pointed out that bandwidth upgrades are expensive and *"it becomes a challenge because you can't have all your funding directed only for bandwidth. You have to do it over a period of time to get that adequate bandwidth in place"*. Thus, it seems that there is a strategy to phase in the bandwidth requirements of G2G over time. Kobus, however, believed that even when bandwidth is increased, it can never be enough. He indicated that *"there is a principle that available capacity always gets consumed. The same applies with bandwidth. You upgrade but you are generally always short. The demand for capacity immediately fills available capacity. You seldom stay with idle capacity"*.

Different approaches were suggested by interviewees to improve the government network infrastructure whilst also considering budget constraints in government. Walter offered an alternative strategy and indicated that there is a need to *"start thinking out of the box, we just continue doing things the same way over and over again"*. He believed that the Department must look into alternative network solutions, such as satellite and 3G connectivity. He added that *"if Telkom is too expensive or not providing appropriate service levels then what other options are available?"* Kasturi also believed that there is a need to look into alternative solutions in order to try to reduce costs to government, and mentioned partnerships with other government entities in KZN such as Dube TradePort. She said: *"Sometimes you think Dube TradePort is an entity of*

government through the Department of Economic Development, but why doesn't government encourage other departments to all utilise Dube TradePort?"

One of the strategies that can be confirmed is that the Department seeks to improve the technical support for ICT infrastructure and networks. This is seen in the KZN DoT IT Operations Technical Support Services tender (KZN DoT, 2012a), which emphasises the Department's strategy to ensure that adequate technical support is in place for "servers, networks and IT infrastructure".

Relationship to the usability sub-theme

If the network is inadequate, this affects the user experience and usability of the G2G system. Veronica confirmed this with her experience: *"The system is not user friendly, there is no hour glass or wheel turning to tell you that the system is thinking. You have to look at the bottom of the screen to see the script writing. And then you just sit and wait. It will be processing in the background, but users do not know. The time it takes to access the modules over the line, it takes so long that you get logged off."* Thus it seems that consideration must also be given during system design to cater for slow G2G performance due to network constraints (e.g. providing appropriate messages to the user, and not logging the user off).

Relationship to the resistance sub-theme

Gerrie believed that there is a direct relationship between bandwidth and user resistance. He stated that *"bandwidth constraints affect an individual's usage of the system. Poor bandwidth means poor user experience; they just become fed up with the speed of the system and will stop using it over time"*. Ria also agreed with this view and shared her experience where users stopped *"working on the system due to bandwidth problems"*. Ari believed that once a user has had a negative experience on one G2G system it can create a negative attitude towards future systems. He described what happens when *"lines are clogged and the systems are slow and then the user does not like the system. They don't want new systems because of the user experience they have had."*

Relationship to the systems development methodology sub-theme

Interviewees mentioned several different network-related considerations for systems development methodologies. Ron believed that the methodologies must improve the chances of planning around network requirements of G2G being done *"in advance"*. He believed that otherwise *"the whole process is too time consuming which will affect system go-live."* Kobus agreed with this and in his experience the planning around networks is done too late in projects: *"You go through the*

whole implementation project and then look into whether the WAN (Wide Area Network) or bandwidth is adequate. Should have been the other way around.”

Gerrie believed that methodologies used for G2G systems should improve the chances of system designs being aligned to available network capacity. He added that *“G2G systems do not always demand high bandwidth, if designed correctly, that is”*. Billy provided an example of a G2G system where there was *“a problem of bandwidth which affected the system speed”*. His view was that *“the system must be built around what is in place, look at the network architecture, don’t just build the system with some pie-in-the-sky design — or sometimes no design at all”*. Thus there is a need for the systems development methodologies to consider the available network capacity, and improve the chances of system designs being appropriate, based on available capacity.

Other views related to systems development methodologies focused on the need to test the impact of the G2G system before implementation, so as to determine how the system will behave when deployed across the network. Gerrie described the need to conduct performance testing of G2G; however, he also stated that it is not taking place at present: *“There is never any performance testing over a network to actually determine the bandwidth constraints upfront and how this will affect the system performance.”* Similarly, Andre indicated that there is a need to establish the volumes of users upfront and *“the impact on the network”*. He cautioned, however, that *“this is also not a once-off thing, you constantly need to be monitoring the network and how the G2G system is behaving on the network. Any issues must be identified and resolved proactively”*.

Relationship to the management support sub-theme

Gerrie believed that management support is needed to address network-related issues that affect G2G. He believed that bandwidth *“is linked to the availability of budget”* and that management needs to make the budget available for bandwidth upgrades. Gerrie also described the lack of management support when network-related issues emerge, which can lead to G2G systems falling into disuse. He indicated that when bandwidth is poor, *“productivity drops to such a low level because the system slows things down so much that management decide to just scrap the slow system. All the while the system is OK, it is just the bandwidth that affects systems performance”*.

Relationship to the HR skills sub-theme

Donna indicated that there is a need for *“expertise in terms of advising Departments on how to address bandwidth constraints”*. Similarly, Kasturi described *“challenges in terms of managing or monitoring usage over the network”*. She indicated that reports are available that provide details on network utilisation; however, *“sometimes I think because you haven’t got the skills here that reporting is not interrogated to bring about proper improvements, making sure that your*

network operates properly.” Andre agreed with this view and mentioned that technical support teams must have the skills and tools to identify and resolve network-related problems proactively.

Another issue related to skills was highlighted by Donna. She believed that service providers implementing G2G systems do not have the appropriate skills to determine how systems should be set up over the government network. She indicated that *“suppliers also make promises and they do not deliver. The system will perform in such and such a way over the WAN (Wide Area Network), and once it is rolled out it performs completely differently. But then it’s too late.”* Thus, appropriate skills are needed to integrate G2G systems into the government networks.

5.8.6 Summary of field data

The field data highlighting how *Technology Infrastructure* supports G2G User Adoption sub-themes is summarised in Figure 58.

How "Technology Infrastructure" supports sub-themes of G2G User Adoption		
OVERALL IMPACT		
Overall impact	Technical Infrastructure	Government Networks
Overall impact of "Technology Infrastructure" on G2G	Differing views on whether the technical infrastructure for G2G is adequate;	Government networks are inadequate for G2G; Bandwidth must be increased and budget allocated for such upgrades;
FURTHER EXPLANATION OF HOW "TECHNOLOGY INFRASTRUCTURE" SUPPORTS SUB-THEMES OF G2G USER ADOPTION		
Sub theme	Technical Infrastructure	Government Networks
Strategy	Strategy must be in place to acquire G2G technical infrastructure and to look into newer infrastructure solutions; Strategy is required to standardise on infrastructure, conduct capacity planning for infrastructure and obtain tools to manage the infrastructure effectively;	Strategy must address effective management of networks, investigating devices to optimise existing bandwidth, conduct detailed analysis of current network to identify potential existing issues; Need to consider availability of budget to upgrade networks, look into alternate network solutions; Need to provide technical support for networks;
Usability	Newer infrastructure solutions may improve usability of G2G;	Poor network capability affects user experience and hampers G2G usability;
Resistance	User may resist using G2G due to inadequate technical infrastructure;	Network capability impacts on user experience of G2G and users may resist using the system if experiences have been negative;
Systems development methodologies	Methodology must ensure that G2G system is developed optimally to minimise negative impacts on the technical infrastructure; Technical infrastructure is required to conduct testing of G2G, and test environments should be similar to the live environment; Methodologies must ensure that technical infrastructure requirements of G2G are established early in systems development lifecycle;	Network requirements must be considered in systems development methodology; System design must be aligned to available network capacity; Methodologies must ensure that the impact of G2G is tested on the network prior to implementation; Volumes of users of G2G and impact on the network must be established early and constantly monitored;
Management support	Managers must ensure that budget is available to provide adequate technical infrastructure;	Management must ensure that budget is available for network upgrades; Management may decide to abandon G2G if the performance of the system across the network is so slow that productivity is seriously impacted;
HR skills	Skills are required to support technical infrastructure, as well as to provide correct specifications for the infrastructure that will be required by G2G;	Skills are required to advise the Department on how to address bandwidth constraints, to provide technical skills in network support and managing and monitoring the network; Service providers must possess skills to configure G2G to operate optimally over the Government network;

Figure 58. Summary of field data — How *Technology Infrastructure* supports sub-themes of Government-to-Government User Adoption

5.9 CONCLUSION

The research question aimed to understand how the identified challenges (User Adoption, HR Skills, Complexity and Technology Infrastructure) affect G2G in the KZN DoT. The field data has shown that each challenge affects G2G in different ways:

User Adoption has emerged as the most important challenge affecting G2G. Therefore, User Adoption has been defined in this study as the *central theme* of challenges affecting G2G. In trying to understand the challenge of User Adoption better, it has emerged from the field data that User Adoption is made up of six different components. In this study these components have been defined as the main themes of user adoption: *User Involvement, Organisational Culture, Change Management, Addressing User Requirements, Priority* and *Business Process Management*. A summary view of how the six main themes affect G2G User Adoption is shown in Figure 59. The field data also identified relationships between the six main themes, which are summarised in Figure 60 (a summary of similar relationships between the main themes as identified in field data) and Figure 61 (a summary of unique relationships between the main themes as identified in field data).

HR skills and Complexity are G2G challenges that manifest in relation to the main theme of User Adoption. Thus *HR skills* and *complexity* have been defined as sub-themes affecting User Adoption.

In addition to the sub-themes of *HR skills* and *complexity*, the field data has also identified other sub-themes related to the main themes of User Adoption. These sub-themes are *systems development methodology, resistance, management support, data quality, usability* and *strategy*. Thus eight sub-themes in total have been identified from the field data. Figures 62 and 63 are a summary representation of how the eight sub-themes affect the main themes of User Adoption. Figure 62 presents a summary of similar relationships between sub-themes and main themes that were identified in the field data, whilst Figure 63 presents a summary of unique relationships between the sub-themes and main themes that were identified in the field data.

Although Technology Infrastructure does present a challenge to G2G in the KZN DoT, this challenge is understood and the solutions are also known by the interviewees. Thus the field data has shown that Technology Infrastructure in itself is *not seen as an important challenge* as compared with the other research questions of User Adoption, HR Skills and Complexity challenges. The field data has, however, shown that there are underlying causes of Technology Infrastructure issues, and this makes implementing solutions to address Technology Infrastructure

challenges difficult. These underlying issues can be related to the sub-themes of User Adoption. A summary of the field data findings in relation to Technology Infrastructure is shown in Figure 58.

Main theme	Summary of overall impact that the Main Theme has on G2G User Adoption
Addressing User Requirements	If user requirements are addressed, the G2G system will be adopted by users.
Business Process Management	<p>The impact of G2G on business processes must be established; Either the business process or the G2G system must be changed to ensure user adoption.</p> <p>G2G is sometimes implemented as a means to solve business process problems. This presents challenges to G2G user adoption.</p>
Change Management	<p>Change management must be implemented to ensure G2G user adoption; Even though change management is important, it is not done on G2G projects;</p>
User Involvement	User involvement increases likelihood of G2G adoption
Organisational Culture	If organisational culture is open to changes and embraces technology, then G2G adoption will be higher.
Priority	G2G must be given appropriate level of priority to ensure that the system is successfully adopted by users

Figure 59. Summary of field data — Overall impact of main themes on Government-to-Government User Adoption


Impacts on 	Addressing User Requirements	Business Process Management	Change Management	User Involvement
Business process management	Business processes must be optimised when user requirements are defined		Change management must emphasise how business processes will be affected by G2G; G2G training serves as a form of change management, but it is often technology focussed and not business process driven;	User involvement creates awareness of how the business processes will be changed by G2G; User involvement increases likelihood that G2G is aligned to how business processes work;
User involvement	Users must be involved in order to address their needs.		User involvement in G2G is a form of change management	
Change Management		Change management must create awareness of how business processes will be affected by G2G		User involvement serves as a form of change management

Figure 60. Summary of similar field data findings — relationships between main themes


Impacts on 	Addressing User Requirements	Business Process Management	Change Management	User Involvement
Business process management	Lack of knowledge of end to end processes			Existing business processes (not necessarily the processes implemented by G2G) may impact on G2G e.g. obtaining approvals; Involving too many users may pose a challenge to G2G if there are differing views on how business processes are to be implemented;
User involvement	Business users sometimes do not want to be involved and expect IT to deliver alone		There are instances where users are not involved at all in G2G; User involvement must be done in a conducive environment to be effective form of change management, as users are sometimes intimidated by IT;	
Change Management				User involvement may make users more understanding and less critical of G2G, when there are issues on the system;

Figure 61. Summary of unique field data findings — relationships between main themes

		G2G User Adoption Main Themes					
Impacts on		Addressing User Requirements	Business Process Management	Change Management	User Involvement	Organisational Culture	Priority
G2G User Adoption Sub Themes	Complexity	Complex to analyse and document user requirements					
	System development methodologies	Lack of systems development methodology; Inability to manage changing user requirements appropriately.	Methodologies must make provision for assessing business processes; Methodologies to ensure that changes to business processes are made.	Methodologies do not adequately cater for change management; Methodologies must ensure that support is provided to users post-implementation;	Methodologies must identify correct users to be involved in G2G;	Culture of meaningful participation in systems development and implementation results in higher user adoption;	
	Resistance	Lack of buy-in			User involvement may reduce resistance from users; Users are involved and will have differing requirements, resulting in some users adopting the system and others resisting it;	The organisational culture can result in resistance to G2G; Individual's users experience of G2G may develop into a culture around G2G;	
	Skills	Users and technical staff must have appropriate skills to define user requirements.	Technical staff must understand the business processes supported by G2G; Technical staff must possess skills in business process re-engineering.	Skills in change management is required; Lack of HR capacity affects the implementation of change management;	Users with correct skills must be involved to obtain accurate user requirements; G2G training is a form of user involvement and it builds skills in G2G;	Lack of adequate capacity and skills has created a culture of reluctance of use G2G, as well as culture of heavy reliance on specific individuals involved in G2G	
	Strategy						An e-Government strategy for the Department is lacking at present, and this is a key requirement; The strategy sets the foundation of e-Gov and G2G; The strategy must establish the importance of IT and e-Gov in the Department;
	Data Quality		High quality data is needed from G2G, in order to increase effectiveness of support provided for business processes; G2G must be integrated into business processes to improve data quality;				Organisational culture affects user discipline on G2G use, which in turn affects the quality of data produced by G2G
	Usability						
	Management Support		Management supported needed to change the existing processes to be in line with G2G; Management support also needed to provide direction on how business processes must be implemented by G2G.	Management support is required to ensure that change management is effective; Management must be part of G2G design and implementation; Management must communicate value of G2G to their staff;	Management support is required to ensure that change management is effective; Management must be part of G2G design and implementation; Management must communicate value of G2G to their staff;	Involvement of management increases management support for G2G; Management must prioritise user involvement in G2G projects over the user's day-to-day business work	Support from management for G2G must be established as part of the organisation's culture. This ensure effective management support.

Figure 62. Summary of similar field data findings — how sub-themes affect main themes

		G2G User Adoption Main Themes					
Impacts on		Addressing User Requirements	Business Process Management	Change Management	User Involvement	Organisational Culture	Priority
G2G User Adoption Sub Themes	Complexity	Complexity is introduced due to outdated technologies, a complex environment, lack of proper knowledge management and outsourcing of G2G system-related functions.	Business processes differ across environments, introducing complexity for the G2G systems supporting those business processes.				
	System development methodologies	Developers taking shortcuts as no methodologies in place; Difficulty in making system changes, as no system documentation exists.		User groups can be implemented as a means of change management	User involvement is also required after implementation of G2G, methodologies must ensure that the involvement is effective.		
	Resistance	Users have alternate reasons for not wanting to use systems.			Users may sometimes be reluctant to change despite being involved in G2G;	Culture of making decisions at the top without involving end users can result in resistance;	
	Skills	Need to teach new consultants about the business for each project; Outsourcing parts of one project to multiple service providers increases demands on skills needed;	Users must understand how G2G implements the business process to increase the effectiveness of G2G.	IT technical skills are needed to ensure that changes to G2G are effectively implemented	Lack of availability of users with the correct skills impacts on whether users can be involved in G2G; Senior Management skills in IT can impact their involvement in G2G	An organisational culture has developed where users do not use G2G, as there are no consequences for non-use; The culture is to train for G2G only at implementation, and not thereafter;	
	Strategy	Need for strategy defining future of systems landscape and the priority					Strategy must make consideration for lengthy processes which impact on G2G projects; Strategy should introduce an oversight body responsible for e-Gov across the province.
	Data Quality		Users work on parts of the business process only, and hence do not understand how their part can impact on data quality further on in the business process	High quality data provided by G2G can serve as a form of change management, as it provides evidence of the value of G2G	User involvement in G2G can improve data quality of G2G, particularly where data is migrated from legacy systems. This is because users have intimate knowledge of their own data.		
	Usability		Systems must be user friendly so that business processes automated by G2G can be executed effectively.				
	Management Support		Management must support the cut over from manual processes to automated processes.	Lack of support from management can negatively affect adoption of G2G		Organisational culture is affected by management understanding of IT and attitude towards IT, this in turn affects the adoption of G2G;	Management must help prioritise G2G in relation to current staff workloads; There is a need for management to serve as a driver of G2G; Management must ensure co-operation within the department and across different departments; Management must be upskilled to provide support; Management support may be politically driven as the administration in government changes every 5 years;

Figure 63. Summary of unique field data findings — how sub-themes affect main themes

Figure 64 graphically shows the themes and sub-themes of G2G User Adoption that have emerged from the field data.

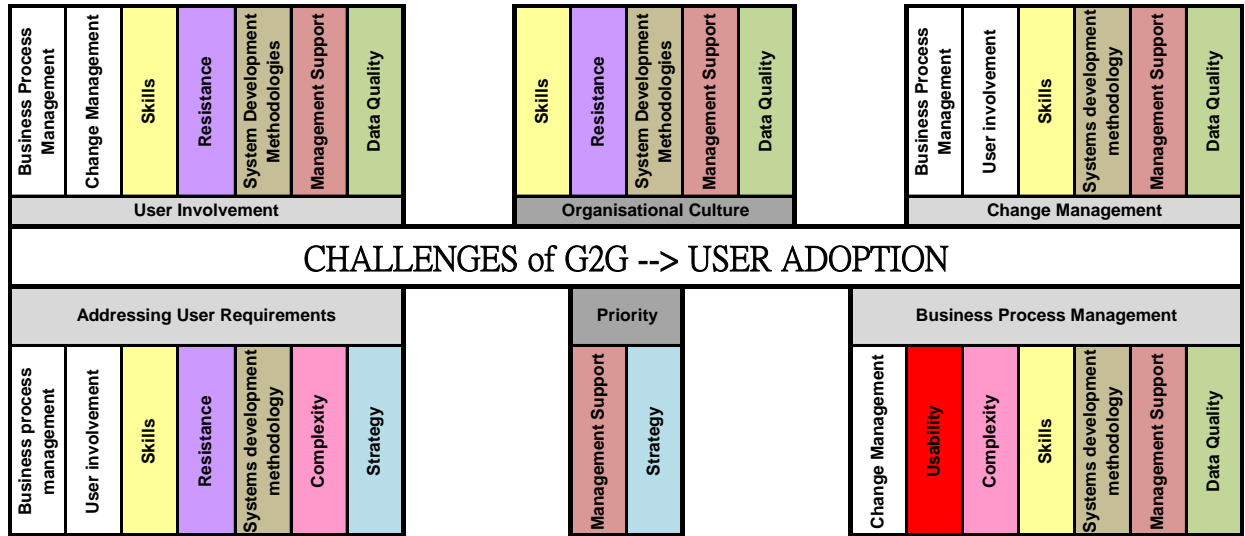


Figure 64. User Adoption as the central challenge of Government-to-Government, and emergent themes and sub-themes of User Adoption

Figures 65 and 66 are alternative representations of Figure 64. These are NVivo 10 models that have been derived directly from the field data.

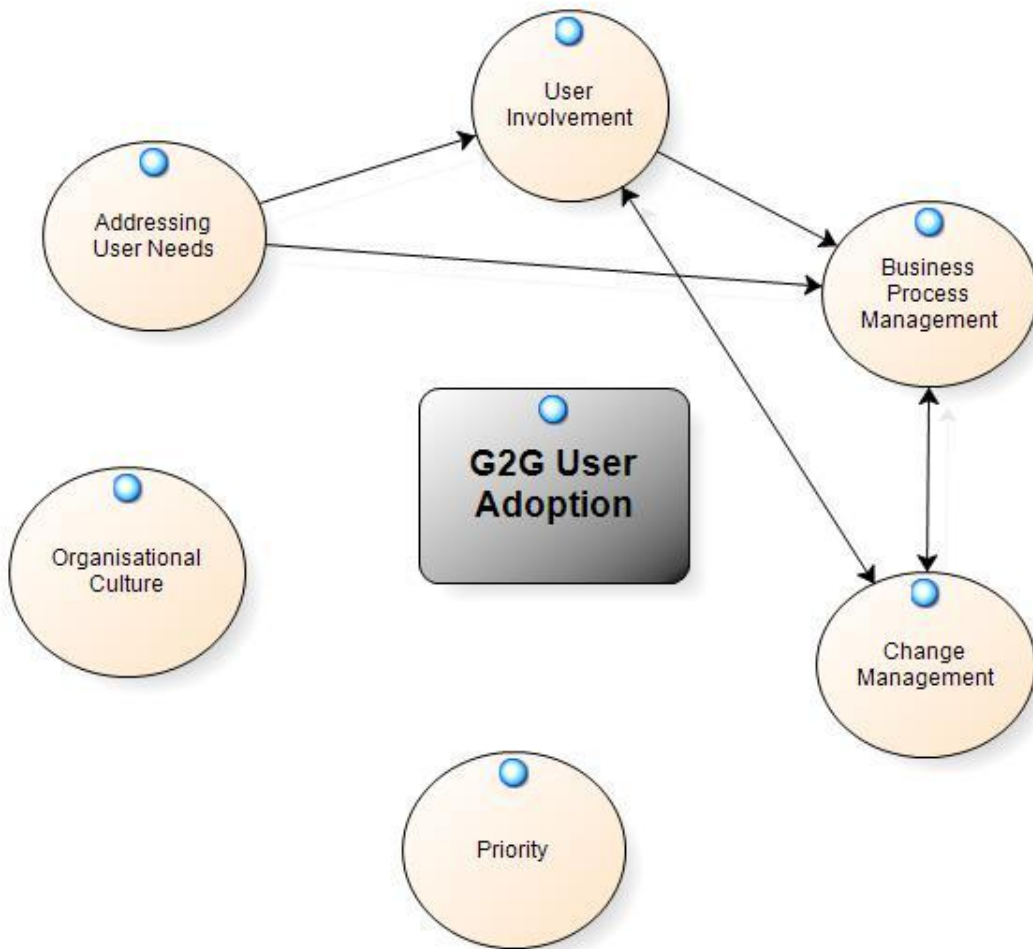


Figure 65. Working model – Challenges of Government-to-Government in the KwaZulu-Natal Department of Transport (Government-to-Government User Adoption as central theme, and relationships between main themes)

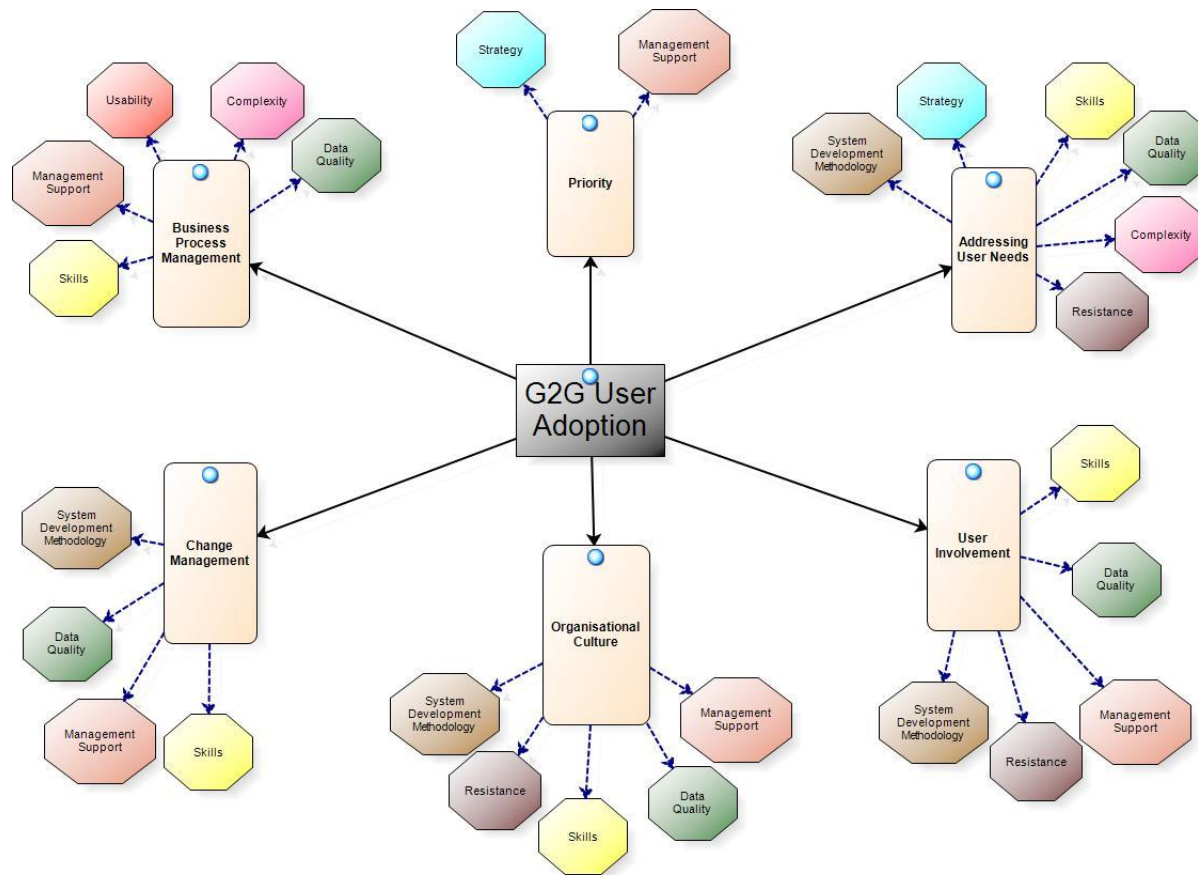


Figure 66. Working model — Challenges of Government-to-Government in the KwaZulu-Natal Department of Transport (Government-to-Government User Adoption as central theme, and relationships between main themes and sub-themes)

Figure 65 shows the relationships between the main themes of G2G User Adoption. Figure 66 shows each of the main themes and sub-themes of G2G User Adoption, as well as relationships between main themes and sub-themes. These two models have been adopted as the current working models of G2G challenges in the KZN DoT. These working models are used as the basis for data interpretation in the following chapter.

CHAPTER 6

INTERPRETATION OF RESULTS

This chapter begins with an explanation of the approach used to draw interpretations from the field data analysis. The field data findings are assessed against the conceptual framework established in Chapter 2. This conceptual framework comprises a model of e-Gov challenges (Factor Model) and three public management theories and models (Fox et al.'s Public Management model, Dunleavy et al.'s Digital Era Governance model, and Schedler and Scharf's e-Gov conceptual framework). Finally, the field data findings are assessed against the academic literature reviewed in the literature review.

Based on these assessments, interpretations are formed regarding the central theme, main themes, sub-themes, relationships between themes and sub-themes, and Technology Infrastructure. The interpretations are summarised in the form of a model explaining the challenges of G2G in the KZN DoT.

For ease of reference the conceptual model as detailed in Chapter 2 is repeated below (Figure 67), together with a mapping to the related sections in this chapter.

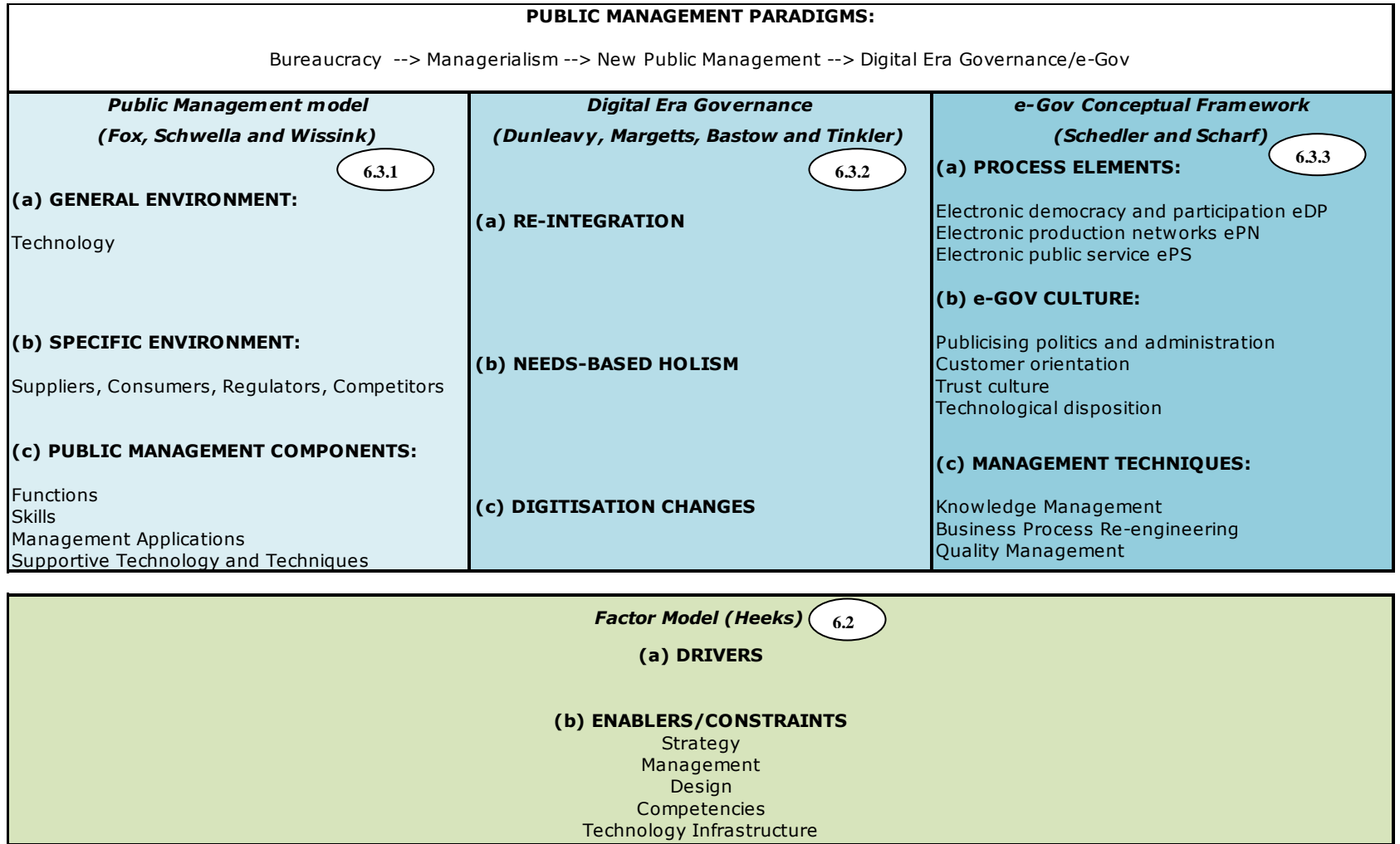


Figure 67. Challenges of G2G: Conceptual framework — repeated

6.1 APPROACH

The field data has provided support for identifying User Adoption as the central challenge facing G2G, and identifying six main themes that affect the User Adoption of G2G. These field data findings are based on the fact that the majority of interviewees mentioned these as challenges facing G2G. A summary of the field data is shown in Figure 68, which indicates the percentage of field data per interviewee in support of each of the six main themes. This graph is not a percentage of field data in relation to the interviewee's transcript (as shown in Chapter 5) but rather a percentage of field data in relation to the total data yielded for the theme. Thus, it can be seen, for example, that of the total data yielded for *Addressing User Requirements*, Kasturi provided the most data.

Although the field data has provided evidence for the findings, there is a need to evaluate the findings before forming interpretations. In order to draw interpretations from the data analysis, the findings from the field data have been mapped against the theories and literature review (as discussed in Chapter 2). As a result, the interpretations are informed by sound theoretical foundations and existing published literature in the field of e-Gov and public management.

The findings from the field data (Chapter 5) can be broadly classified as follows: the positioning of User Adoption as the central challenge facing G2G; the existence of the six main themes as challenges facing G2G and G2G User Adoption; the existence of the eight sub-themes as challenges facing G2G; the existence of the relationships between themes and sub-themes; and the positioning of Technology Infrastructure as a challenge facing G2G, which is seen as less important. The findings related to the central theme, main themes and Technology Infrastructure are based on the views of the majority of interviewees. The findings related to sub-themes are based on whether the number of interviewees who supported them as challenges exceeded the number of interviewees who did not support them as challenges. The following sections in this chapter present the evaluation of this classification of field data findings against the theories and literature. Finally, interpretations and conclusions are drawn.

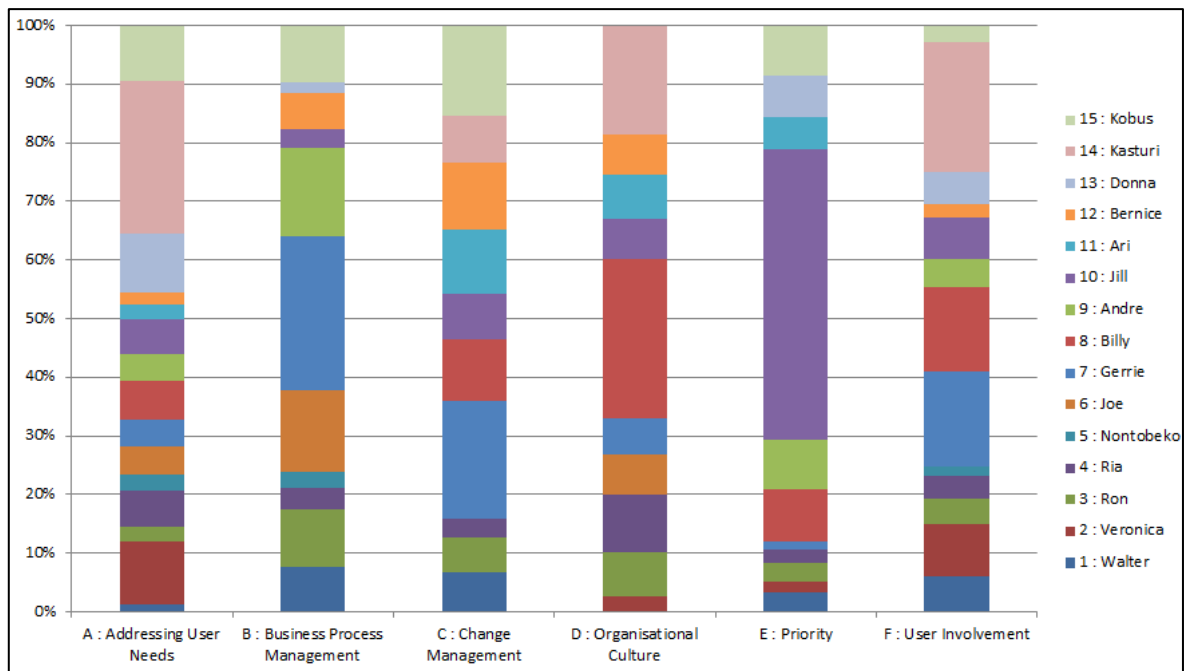


Figure 68. Field data per interviewee as a percentage of total data yielded for the theme

6.2 ASSESSING THE FINDINGS AGAINST THE FACTOR MODEL

The central theme, main themes and sub-themes that emerged from the field data analysis have been compared to the Factor Model, identified in the literature review. A summary of this comparison is shown in Table 16.

The theories either mapped directly to field data findings (indicated by a “D”) or mapped partially to field data findings (indicated by a “P”). A count of the direct and partial mappings is provided for each ICT and e-Gov theory, as well as for each of the field data findings. In qualitative research, counting is used to provide evidence for the analytical reasoning (Miles et al., 2014). Thus, this table provides the evidence for how the field data relates to and is supported by the Factor Model.

It can be seen in Table 16 that field data findings for the main themes and sub-themes are supported either directly or partially by the Factor Model. It can therefore be concluded that the field data findings related to the main themes and sub-themes have strong theoretical support. The support provided by the Factor Model is discussed in detail in the following sections. Refer to Chapter 2 (section 2.4.1) for an overview of the Factor Model.

Table 16. Summary of data analysis: central, main and sub-themes compared to the Factor Model

FINDINGS: DATA ANALYSIS		Model of e-Gov challenges
		Factor Model
G2G Central Theme	User Adoption	
G2G User Adoption Main Themes	Addressing User Requirements	
	Business Process Management	
	Change Management	D
	User Involvement	P
	Org Culture	
	Priority	D
Technology Infrastructure Main Themes	Availability of technical infrastructure	D
	Government Networks	D
G2G User Adoption Sub Themes	strategy	D
	usability	D
	complexity	P
	resistance	
	system development methodology	P
	management support	P
	HR skills	D
	data quality	P
Direct Matches		7
Partial Matches		5
TOTALS		12

6.2.1 Factor Model

The Factor Model provides support for the field data findings, supporting 12 out of a total of 17 findings. The Factor Model directly supports seven of the field data findings and partially supports

five of the field data findings related to the central theme, main themes and sub-themes. Table 17 shows how the Factor Model provides either direct or partial support for the field data findings.

KEY:

	Main Theme
	Sub Theme

Table 17. Evaluation of how the Factor Model supports findings from the field data

FACTOR MODEL	
Direct Mapping	
Data Findings	Theoretical F/W
Change Management	The model recognises effective <i>Change Management</i> as an enabler for e-Gov success.
Priority	<i>Priority</i> can be mapped to the “Drivers” category of the Factor Model. The model indicates that in order for e-Gov to succeed, there must be internal political will as well as pressure from outside government, e.g. from citizens. Thus, the model supports the view that e-Gov must be given adequate <i>Priority</i> for success.
Availability of Technology Infrastructure	The model recognises adequate Technology Infrastructure as an enabler for e-Gov success.
Government Networks	Government networks are seen as a form of Technology Infrastructure in the Factor Model and are an enabler for e-Gov success.
Strategy	The model recognises the need for an overall vision and <i>strategy</i> as an enabler for e-Gov success.
Usability	The Factor Model indicates that an effective design is required for e-Gov to be successful, whilst poor or unrealistic designs will lead to failure. Hence, this lends support to the field data findings related to <i>usability</i> as a challenge to G2G.
HR skills	The Factor Model indicates that the requisite competencies must be in place for e-Gov success. This therefore lends support to the field data findings related to <i>HR skills</i> as a challenge to G2G.
Partial	
Data Findings	Theoretical F/W
User Involvement	Data findings related to <i>User Involvement</i> can be mapped to the

FACTOR MODEL	
	<p>“Competencies” and “Design” dimensions of the Factor Model. The model indicates that users must be involved to improve the chances of effective designs of G2G. In addition, users must possess appropriate competencies to be involved meaningfully in e-Gov; conversely, the involvement of users in e-Gov leads to the development of additional competencies in users.</p>
Complexity	<p>Data findings related to User Involvement can be mapped to the “Design” and “Technology” dimensions of the Factor Model. The model indicates that complex and unrealistic designs of e-Gov may lead to failure. Similarly, <i>complexities</i> and incompatibilities in infrastructure may lead to the failure of e-Gov.</p>
System development methodologies	<p>The Factor Model indicates that effective project management is required to improve the chances of e-Gov success, and this in turn requires that the methodologies used for the development of e-Gov are adequate and appropriate. Hence, the Factor Model lends support to the findings of G2G challenges related to <i>systems development methodology</i>.</p>
Management support	<p>This data finding can be related to the “Drivers” category of the Factor Model. The model indicates that support, knowledge and ownership from management are required for e-Gov success.</p>
Data quality	<p>Data findings related to <i>data quality</i> can be mapped to the “Design” dimension of the Factor Model. The model indicates that a design that does not consider current data constraints and future data requirements for e-Gov will contribute to e-Gov failure.</p>

6.2.2 Relationships between main themes and sub-themes supported by the Factor Model

The field data analysis has identified the relationships between the themes and sub-themes, as well as relationships amongst themes. The Factor Model provides limited support for these relationships as summarised in Table 18. Where the Factor Model has provided partial support for the relationships this is denoted by a “P”.

Out of a total of 34 relationships identified from the field data (see Figures 24, 25 and 57) only two relationships were supported by the Factor Model as discussed in the following sections.

Table 18. Summary of data analysis mapping of themes to sub-themes compared to Factor Model

Relationships in field data		e-Gov challenges model
Themes	Themes/sub-themes	Factor Model
Priority	Management support	P
Priority	Strategy	P

The Factor Model recognises the need for management to provide support, ownership and direction to e-Gov in order for e-Gov to succeed. This model therefore supports the data findings of the relationship between *Priority* and *management support*.

The Factor Model also provides support for the data findings of the relationship between *Priority* and *strategy*. According to the model, an overall vision and strategy must be in place that gives e-Gov the necessary level of importance. e-Gov must also be incorporated into the broader reform goals and strategy of government, thus indicating that the priority of e-Gov in the context of government's overall strategies must also be established.

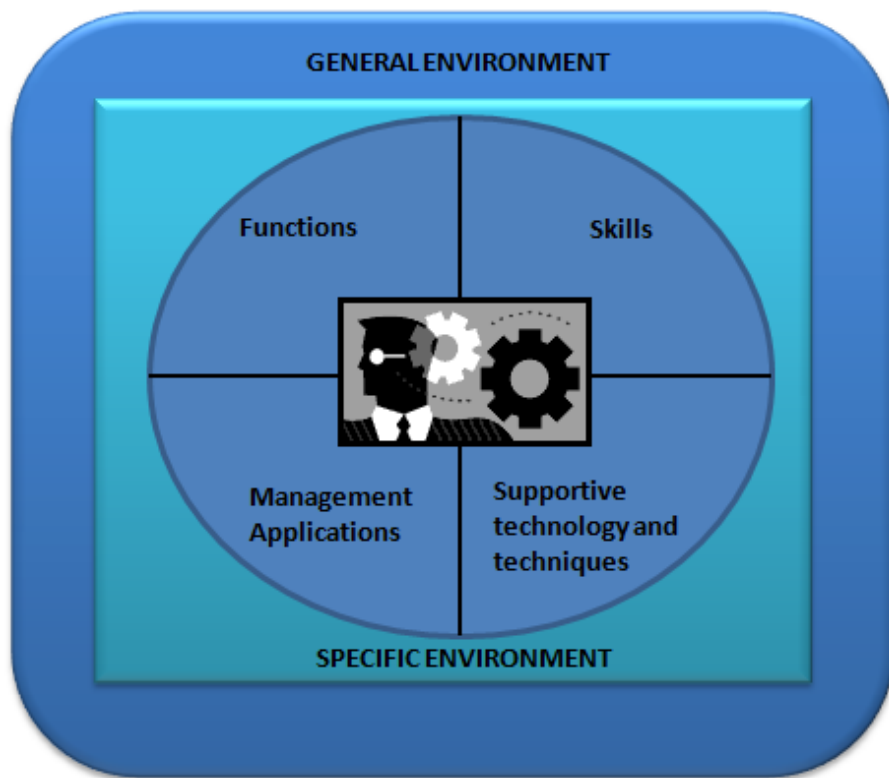
6.3 ASSESSING THE FINDINGS AGAINST PUBLIC MANAGEMENT THEORY

The central theme, main themes and sub-themes that emerged from the field data analysis have been discussed in relation to the public management theories and models discussed in the literature review. In particular, the impact of the technology environment on public management is discussed using the Public Management model (Fox et al., 2004). Thereafter data findings are discussed in relation to Digital Era Governance (DEG) which is seen as a post-NPM model (Dunleavy et al., 2005). Finally, the Schedler and Scharf (2001) e-Gov conceptual framework is used to interpret the field data analysis.

6.3.1 Technology environment influences on public management

The Public Management model (Fox et al., 2004) was introduced and the impacts of ICT on public management, according to this model, were discussed in detail in section 2.5.3.1.

For ease of reference the Public Management model, as well as the model highlighting the impacts of ICT on the Public Management model, are repeated here (Figures 69 and 70 respectively). The data findings from this research will be interpreted through the Public Management model. For readability purposes, the convention of using *italics* is applied in this section when referring to any component of the Public Management model or any of the research findings' themes and sub-themes.



GENERAL ENVIRONMENT				
Political	Social	Economic	Technological	Cultural

SPECIFIC ENVIRONMENT			
Suppliers	Competitors	Regulators	Consumers

FUNCTIONS
Policy-making Planning Organising Leading Control and evaluation

SKILLS
Decision-making Communication Management of change Management of conflict Negotiation

APPLICATIONS
Policy Analysis Strategic Management Organisation Development

SUPPORTIVE TECHNOLOGY & TECHNIQUES
Computer technology and information management Techniques for public management

Figure 69. Public Management model (Fox et al., 2004)

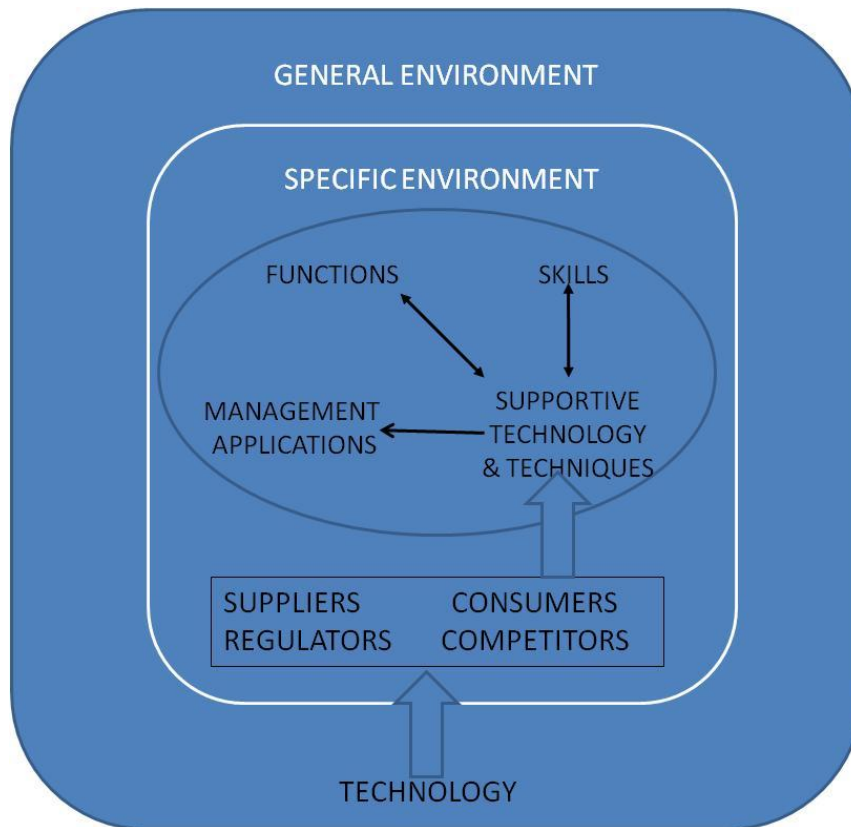


Figure 70. Impacts of ICT on the Public Management model (adapted from Fox et al., 2004) — repeated for reference purposes

The data has shown that *Priority* is an important theme for the successful adoption of G2G, and linked to *Priority* are the sub-themes of *management support* and *strategy*. According to the Public Management model, technology exists in the *general environment* and becomes more concrete through the *specific environment* (suppliers, consumers, regulators, competitors). This in turn influences supportive technologies, which can be seen as the use of ICT-based systems within government, and supportive technologies are thus akin to G2G. In order to establish the appropriate *Priority* for G2G and to ensure *management support* and *strategies* are in place, the Public Management model provides a very clear and simple answer. Since technology must only be applied in the public sector through the *specific environment*, line of sight must be maintained between the G2G system and the suppliers, consumers, regulators, competitors, or any combination thereof that the G2G system will serve. Thus, although G2G is to be used inter- and intra-government, it is important to remain clear on the *specific environment* that G2G will support. This ensures that technology is not used simply for the sake of technology, and at the same time establishes for G2G the appropriate *Priority* and related *management support* and

strategy. Interpreted according to the Public Management model, the issues identified in the data analysis relating to *Priority*, *management support* and *strategy* may therefore be related to inadequate line of sight to the *specific environment*.

Organisation development is identified as one of the *management applications* in the Public Management model. This can be viewed as a planned approach to increase organisational effectiveness and health, and is usually driven from the top. Organisation development comprises three components: diagnosis, action (through organisation-development interventions) and process maintenance (assessing the effectiveness of interventions) (Fox et al., 2004). Interventions may target individuals, teams, groups, inter-group relations or may even be organisation-wide. Although the Public Management model presents Organisation development as a generic *application* in the public sector, Organisation development may be useful in interpreting the data findings in relation to *Organisational Culture* and *Business Process Management*.

The relationship between Organisation development and *Organisational Culture* is clear; Organisation development seeks to improve and optimise the overall organisational culture so as to lead to the achievement of business objectives. The data analysis has identified several issues related to *Organisational Culture* which affect G2G (discussed in section 5.7. and summarised in 5.7.4). These *Organisational Culture* issues may be related to not following a structured approach to managing the organisational culture impacts of G2G. Viewed differently, Organisation development *application* as described in the Public Management model may offer a solution to addressing the G2G *Organisational Culture* issues identified in the data analysis.

The relationship between the G2G *Business Process Management* issues identified in the data analysis and the Organisation development *application* in the Public Management model is more indirect. The Organisation development *application* in the Public Management model describes interventions that can be undertaken to improve organisational effectiveness and health. At least two of these interventions are related to *Business Process Management*: process consultation and role analysis. Thus, applying these interventions may address the *Business Process Management* issues related to G2G which emerged in the analysis of data in this research.

The Public Management model also identifies *skills* as one of the components of public management, with specific emphasis on the skills associated with decision-making, communication, change management, conflict management and negotiation. Although all of these skills are applicable to implementing G2G (for instance making decisions about which technologies to use, negotiating with suppliers of G2G systems, and communicating impacts of G2G to staff), the particular skill of change management stands out as this also emerged as one of the main themes in the data analysis. The Public Management model emphasises the importance

of adapting to the environment in order for any institution to survive. It also indicates that introducing change threatens the status quo and increases ambiguity and uncertainty, and may therefore be met with resistance (Fox et al., 2004). There are, however, several techniques that can be applied to implement changes in the public sector more effectively and a number of these techniques emphasise the participation of those affected by the change. Change management, as described in the Public Management model, can therefore be related to and used to explain three different data findings in this research: the main themes of *User Involvement* and *Change Management*, and the sub-theme of *resistance*. Skills need to be developed in the public sector to manage changes associated with G2G more effectively. This concept is, however, not new, as change management was already an existing skill in the Public Management model. It can therefore be assumed that the public sector is not appropriately or adequately applying change management in general, and this deficiency is not only related to G2G changes. Applying change management will also, according to the Public Management model, assist in reducing user resistance, and several change management techniques are identified that could be used. Finally, the Public Management model supports the data finding that involving users in G2G will serve as a form of change management. In summary, according to the Public Management model, the lack of skill in change management can be seen as one of the reasons for the *Change Management* issues identified in the data analysis. This in turn can be used to explain the issues identified in the data analysis related to *resistance* and *User Involvement*.

Another direct relationship between the Public Management model and the data analysis is the sub-theme of *strategy* and the *management application* of Strategic management in the model. Strategic management can be seen as formulating, implementing and evaluating actions to facilitate the achievement of an organisation's objectives (Fox et al., 2004). The data analysis has identified issues related to G2G, including lack of a G2G strategy, emphasising the importance of such a strategy and the need for the strategy to consider the unique context of the public sector and the department. The Public Management model provides guidelines and techniques for strategic management that would aid in developing a G2G strategy. It can therefore be concluded that although the Public Management model incorporates strategic management as an *application*, and in its present form in the model strategic management can be applied to G2G, this has not taken place in the KZN DoT. This, in turn, could explain the issues related to G2G strategy which emerged in the data analysis.

The preceding sections have described how the Public Management model can be used to explain the findings of the data analysis. In this section the converse is discussed, focusing on the data analysis implications for the Public Management model. Two components of the Public Management model are identified which may be directly impacted by the data analysis: *skills* as

identified in the model and the *management application* of policy analysis. Although the Public Management model identifies a core set of skills for public management (decision-making, communication, change management, conflict management and negotiation), the data analysis has identified the need for additional skill sets to improve G2G user adoption. These skills can be broadly classified into the technical skills needed to design, develop, implement and support G2G, and the management skills needed to support and participate in G2G projects effectively. Although the core set of skills in the Public Management model does at a generic level address the G2G management skills required, it is perhaps necessary to emphasise in the Public Management model the technology dimension associated with the core skills of decision-making, communication, change management, conflict management and negotiation. With regard to the technical skill-set requirements which emerged during the data analysis, it may not be necessary to incorporate these skills into the Public Management model itself. For instance, a government department may decide to outsource these skills to a service provider. An alternative view is that these technical skills sets may not be viewed as a core set of skills for public management, and hence do not warrant inclusion or emphasis in the Public Management model. The researcher therefore believes that it will be adequate if the Public Management model firstly emphasises the technology dimension associated with the core skills (in the *skills* component of the Public Management model), and secondly makes provision for the technical skills required for G2G as part of the standard functions that exist in the Public Management model (in the *functions* component of the Public Management model).

The Public Management model identifies Policy analysis as a *management application* in the model. Policy analysis is concerned with generating information for optimal policy decisions, and encompasses analysing policy content, analysing policy systems, analysing policy issues and analysing policy outcomes (Fox et al., 2004). Since Policy analysis has a dependency on information, and also produces information as its output, it would be reasonable to assume that the Public Management model requires an emphasis on the role of G2G in policy analysis. Thus, since one of the G2G concerns is information management, G2G can be useful and important in policy analysis. The data analysis has also identified *data quality* as a sub-theme, and the importance of high-quality data was established in order to improve the execution of governmental business processes. Thus, the data analysis has confirmed that G2G has a significant role to play in the execution of a department's business processes, where such business processes incorporate policy analysis.

The Public Management model provides useful insights into understanding and interpreting the findings of the data analysis. In addition, the data analysis has provided some implications for how the Public Management model may be affected by G2G. These impacts are summarised below in

Tables 19 and 20. Table 19 summarises how the data findings’ themes and sub-themes can be interpreted with the applicable components of the Public Management model, whilst Table 20 shows how the Public Management model may be affected by the applicable themes and sub-themes of the data findings. The colour coding is used simply for readability, to cluster common components of the Public Management model and the data findings’ themes and sub-themes. No further meaning is implied through the use of colour coding.

Table 19. Interpreting the data analysis through the Public Management model

Main theme	Sub theme		Public Management Model	
Priority ²	Strategy	→	General Environment	Technological
	Management Support		Specific Environment	Suppliers, Competitors, Regulators, Consumers
Business Process Management		→	Management Applications	Organisational Development
Org Culture				
Change Management	Resistance	→	Skills	Management of Change
User Involvement				
	Strategy	→	Management Applications	Strategic Management

Table 20. Implications of the data analysis for the Public Management model

Public Management Model			Main theme	Sub theme
Skills	Decision making, communication, management of change, management of conflict, negotiation	→		HR Skills ¹ - management skills
Functions	Polymaking, planning, organising, leading, control and evaluation			
Management Applications	Policy analysis	→		Data Quality

6.3.2 Digital Era Governance — Post New Public Management

Digital Era Governance (DEG) is described by Dunleavy et al. (2005) as a post-NPM public management model. Three themes are identified, and within each theme various components are detailed, as discussed in section 2.5.3.2. These components of DEG are used to interpret the data analysis findings.

Table 21 presents each of the DEG components and indicates whether the component is applicable to the data findings or not. Some of the components map indirectly to the data findings. The following sections discuss in detail the components of DEG in relation to the data findings.

Table 21. Summary mapping of DEG components and applicability to data findings

Theme	Ref	Component	Applicability to data findings
RE-INTEGRATION	R 1	Roll back of agencification	N
	R 2	Joined up government	Y
	R 3	Re-governmentalisation	Y
	R 4	Reinstatement of central processes	Y
	R 5	Radical squeezing of production costs	Y
	R 6	Re-engineering back office functions	Y
	R 7	Procurement concentration and specialisation	Y
	R 8	Network simplification	N
NEEDS BASED HOLISM	N1	Client based or needs based organisation	N
	N2	One stop provision	Indirect - Strategy
	N3	Interactive and “ask once” information seeking	Indirect - Strategy & Data Quality
	N4	Data warehousing	Y
	N5	End to end service re-engineering	Y
	N6	Agile government processes	Indirect - Strategy
DIGITIZATION PROCESSES	D1	Electronic service delivery	Indirect - Strategy
	D2	New forms of automated technologies	Indirect - Strategy
	D3	Radical disintermediation	Indirect - Strategy
	D4	Active channel streaming	Indirect - Management Support & Resistance
	D5	Facilitating isocratic administration and co-production	Indirect - Strategy
	D6	Moving toward open book government	Indirect - Strategy

KEY:

	Indirect mapping to data analysis: Management Support & Resistance
	Indirect mapping to to data analysis: Strategy
	Direct mapping to data analysis
	No mapping to data analysis evident

6.3.2.1. Digital Era Governance components not applicable to data findings

Structural changes to government departments and agencies are described by the DEG components of Roll-back of agencification, Network simplification and Client/needs-based organisation. These components of DEG are concerned with assimilating government agencies into other departments, stopping the creation of a complex tier of regulators, or reorganising government departments to serve a single client group.

Within the context of the KZN DoT, various related government departments and agencies exist (see section 1.2.3). However, reorganising these departments and agencies did not feature as a finding in the data analysis. This is not to say that this component of DEG is not applicable to G2G or that it does not present a challenge to G2G. It means that in this research, the participants did not believe that reorganising other departments/agencies (which affect KZN DoT) presents challenges to G2G. This is possibly because the types of G2G systems described by the research participants were mainly related to intra-departmental functionality, as opposed to inter-departmental functionality. Hence, there is no significant dependence on other departments/agencies. This component of DEG may, however, present a challenge at a later stage of maturity of e-Gov, as the KZN DoT successfully implements intra-departmental G2G and starts to move towards inter-departmental G2G.

In summary, Roll-back of agencification, Network simplification and Client/needs-based organisation did not emerge as a challenge facing G2G. This can, however, be attributed to the fact that the KZN DoT is presently focusing on intra-departmental G2G systems. It is, however, reasonable to assume that as the department matures in its implementation of G2G and starts to actively pursue inter-departmental G2G, these components of DEG may feature more prominently as challenges or considerations for G2G.

6.3.2.2. Digital Era Governance components indirectly related to data findings

Digital Era Governance implications for management support and user resistance:

The *Active channel-streaming* component of DEG seemingly applies specifically to G2C and G2B (outward facing towards end users of e-Gov); it can, however, also be interpreted in terms of G2G. The data findings have highlighted the need for management to enforce the use of G2G by end users, which in the case of G2G is departmental staff. The data findings also identified the need to integrate G2G into business processes, so that G2G cannot be bypassed, and the need for management to support the transition from manual processes to automated processes supported by G2G.

During the data analysis it emerged that *user resistance* clearly affects User Adoption of G2G, and various reasons for such resistance were identified.

Active channel-streaming as a component of DEG indicates the need to actively pursue and incentivise users to switch to e-Gov or to compel the use of e-Gov through regulatory frameworks. Extending this concept to G2G, it means that management needs to incentivise staff to make use of G2G, actively pursue the end user adoption of G2G or enforce the use of G2G within a

department (possibly through departmental policies and procedures). This interpretation is congruent with the data analysis findings, and crystallises the role and responsibilities of management in government departments if G2G is to be successfully adopted.

Digital Era Governance implications for strategy:

The data findings clearly highlighted the importance and the need for a departmental strategy for e-Gov. This strategy should establish the importance of ICT and e-Gov in the department. Various components of DEG can be used to further define what the e-Gov strategy should seek to achieve. Although these components of DEG may not necessarily be useful in interpreting the data findings, the components did emerge during the data analysis and hence are identified here as an indirect relationship between the data findings and DEG components.

One-stop provision, Interactive and “ask once” information seeking and Agile government processes are DEG components within the Needs-based Holism theme. These components are focused on simplifying the citizen’s interactions with government, simplifying the collection of data, reusing existing data where possible, and being able to respond more quickly to environmental changes. These DEG components can therefore be seen as strategic drivers or imperatives that would possibly need to be included as part of a strategy for e-Gov.

Similarly, the data analysis identified several components of DEG within the Digitization Processes theme which could potentially be included in the e-Gov strategy of the department. These DEG components include: *Electronic service delivery, New forms of automated technologies, Radical disintermediation, Facilitating isocratic administration and co-production* and *Moving toward open-book government*. These DEG components can be viewed in terms of two clusters whereby *Electronic service delivery, New forms of automated technologies* and *Moving toward open-book government* describe some of the basic objectives that e-Gov should achieve, and hence help establish the business case for e-Gov in a department. *Radical disintermediation, and Facilitating isocratic administration and co-production*, on the other hand, describe a greater level of maturity in utilising e-Gov in a government department. Hence, in a strategy, these two DEG components could be used to describe the e-Gov utopia.

The data analysis has identified the need for an e-Gov strategy to overcome some of the challenges of e-Gov. DEG components provide insight into what such a strategy should seek to address, and the different components can also be viewed as a maturity curve for e-Gov, with some components describing the foundational objectives of e-Gov and other components describing the e-Gov utopia.

6.3.2.3. Digital Era Governance components directly related to data findings

Several components of DEG can be mapped directly back to the data findings of this research. Thus DEG can be used to interpret the data findings. These interpretations are discussed according to the DEG themes where such mappings were found, i.e. Reintegration and Needs-based holism.

Reintegration:

- **Joined-up government:** Integrating government departments and moving away from silo operations clearly emerged in the data analysis as an objective for G2G. However, issues around *Business Process Management* were identified which limited the ability to achieve this objective.

Thus, although DEG seeks to achieve Joined-up government, e-Gov and G2G cannot be seen as the only means to achieve this. The need to fully analyse business process implications has been identified in the data, as well as the need to be supported by systems-development methodologies that provide structure on how this business process analysis is conducted. In addition, the need emerged for technical people (such as systems developers) to understand how business processes are affected by G2G and vice versa.

- **Re-governmentalisation:** Re-governmentalisation is concerned with reabsorbing into the public sector activities which were previously outsourced to the private sector. With regards to ICT functions in a government department, this component of DEG was not supported by the data analysis. In the current environment in the KZN DoT, the majority of ICT functions are outsourced to the private sector. Two specific issues also emerged in the data analysis related to outsourcing.

Firstly, due to the nature of procurement in the public sector (which may result in changes of service providers over time), and staff turnaround in general, several different people may be involved during the lifespan of any one G2G project. This presents a problem for the department as they will have to re-teach the business of the KZN DoT to staff or consultants, and the process starts almost from the beginning each time there is such a change in staff or service provider.

The second issue which emerged was related to the use of poor/inadequate systems development methodologies. This results in little or no systems documentation, making support of the system and enhancements of systems difficult. This becomes even more

of an issue if there is a change in service provider over time, as the new service provider will not necessarily have all the requisite system documentation to continue with appropriate service provision.

Thus, although DEG identifies Re-governmentalisation as a component, with regard to ICT functions in a government department this does not seem to be a consideration at present. On the contrary, the outsourcing of ICT functions presents some specific challenges to G2G.

- **Reinstatement of central processes:** Although standardisation of business processes was an overall objective of G2G in the data analysis, it was also found that there are several legitimate reasons why business processes in a department may need to vary (or be variants of a standard process). The data analysis identified this variation as a form of complexity facing G2G, as the system must now automate more complex business rules. Coupled to this is firstly, the need for management support to make decisions around standardisation or non-standardisation of business processes; secondly, the need for systems development methodologies that rigorously analyse and appropriately implement such variations of business processes; and thirdly, the need to overcome user resistance when, for instance, a business process is standardised in a system and yet the end user chooses to still follow their old variant process and bypass the implemented G2G system.
- **Radical squeezing of production costs:** This component of DEG is concerned with the use of ICT to reduce manual or human tasks, thereby reducing staffing levels, and introducing cost savings in a government department. Reducing staffing levels due to G2G was not identified in the data analysis. In contrast, the staffing levels increased in terms of the ICT staff needed to implement and thereafter provide support for the G2G system.

Another contrasting view from the data analysis was that the KZN DoT is presently already understaffed. Implementing a G2G system with standardised business processes and rigorous business rules has in fact been shown to demand more staff to appropriately use the G2G system. Since these staff do not exist, systems are slowly being abandoned over time. The need was established in the data analysis for the e-Gov strategy to holistically look at all the requirements for G2G, including staffing levels. The staffing requirements cannot only be considered at the end of a system's implementation.

- **Re-engineering back-office functions:** Business process re-engineering (BPR) was a clear finding in the data analysis. The impacts of BPR have already been discussed under Joined-up government. Similarly, the issues around the outsourcing of ICT have been discussed above under Re-governmentalisation.

This component of DEG also seeks to eliminate legacy systems. The data findings have, however, identified this as problematic, since there is little documentation on legacy systems and hence the actual requirements for a new system are difficult to define. Added to this is the issue of staff turnover, where staff who were knowledgeable on a legacy system have since left the department with inadequate handover (if any). Thus, the lack of documentation on legacy systems, together with the loss of skills and knowledge of those legacy systems, makes the replacement of such legacy systems difficult.

Thus BPR as per DEG has been partially supported by the data findings. Optimising back-office functions through the use of ICT was a clear objective in the data analysis; however, this re-engineering of business processes is not without its challenges. On the other hand, BPR as per DEG also refers to the reduction of outsourced ICT and the elimination of legacy systems. The data analysis has, however, shown that this is not currently happening in the KZN DoT.

- **Procurement concentration and specialisation:** This component of DEG emphasises optimisation and innovation within procurement functions. However, the data findings have revealed that the opposite is in fact taking place in the KZN DoT. The outsourcing of e-Gov development and implementation has been shown to introduce several challenges. Thus, one of the data findings was the need to develop an e-Gov strategy which takes into consideration the lengthy procurement processes that must be followed to bring a service provider on board for any e-Gov project.

Another related issue from the data analysis was the need to re-teach consultants the business of the department, as contracts may be awarded to different service providers over a period of time. Linked to this was the possibility that different parts of the same project may be outsourced to different service providers, e.g. service provider 1 does requirements analysis, service provider 2 does the development and implementation, and service provider 3 may be awarded the contract for support and maintenance. The data analysis indicated that this arrangement may increase the complexity of an e-Gov project whilst also increasing the level of skill needed from staff.

Systems-development methodology challenges and shortcomings also featured strongly in relation to procurement. In particular, the systems-development methodologies do not cater adequately for documenting systems designs and development, thus making it difficult to modify systems at a later stage. The data did not, however, clarify whether it was the methodology itself, the service provider's lack of adherence to the methodology, or the staff lack of skills in implementing the methodology. These documentation-related shortcomings may, however, also contribute to the complexity mentioned above, in cases where one service provider has to continue from where another service provider has left off.

Other challenges related to procurement are the lack of manoeuvrability within a contract's scope once a tender has concluded. During the course of the development project, it may emerge that there is a need to change the documented user requirements. However, the contract may limit the extent to which such changes may be applied, hence forcing users to live with a system that is less than optimal. The lack of provision for post-implementation systems support in contracts also came across clearly in the data analysis, with focus being given mainly to the development and implementation as if it were a once-off activity. Usually it is only later that the need for post-implementation systems support and maintenance is identified, necessitating a new procurement process and the likelihood that the contract may be awarded to a different service provider. Thus, the issues highlighted above (long lead times to conclude procurement processes, lack of documentation to support handover to a new service provider and the need to re-teach the business) emerge, and these issues seem to be cyclical.

Needs-based holism:

- **Data warehousing:** Data warehousing as envisaged in DEG emerged as a goal of G2G in the KZN DoT. However, it was also acknowledged that the G2G systems initially provide the base data, and this in turn facilitates integration and data sharing within the department, which will finally provide the platform for the sharing of meaningful data across different government departments. The latter includes data sharing with sister departments (e.g. the DoT in other provinces) and parent departments (e.g. the national DoT). Thus G2G provides the underlying foundation for data warehousing. Without effective G2G, data warehousing will be a superficial collection of data which will likely contain duplication and prove difficult to consolidate into a meaningful representation.

The importance of a provincial strategy for e-Gov came across clearly in the data analysis. This strategy provides the direction for the implementation of e-Gov within departments whilst also ensuring that different departments work towards a common goal of data sharing and moving away from silo processes and systems.

The quality of data also emerged from the data analysis. Underlying issues affecting data quality were identified: lack of integration of G2G into the business process such that users bypass the system leading to poor-quality data; poor user discipline in utilising G2G, impacting on poor data quality; and users not seeing the end-to-end picture of their role in the system, such that poor-quality data upstream leads to even poorer quality of data downstream. On the other hand, the impact of good-quality data also emerged as a valuable asset for stakeholders and G2G as well. Good-quality data will improve the effectiveness of departmental business processes and in turn service delivery to citizens; good data quality also reinforces the power and value of the G2G system for users and may hence be a type of change management.

- **End-to-end service re-engineering:** This component of DEG necessitates thinking about the whole process without the restrictions imposed by the existing boundaries. BPR was a clear finding in the data analysis and the impacts thereof have already been discussed. It may, however, be worth reiterating that the data analysis identified complexity in re-engineering business processes, since the same process may be executed differently in different parts of the organisation; and individuals may work only on a part of the process and hence do not understand the "bigger picture". Similarly, the need for management support for effective re-engineering was deemed critical, especially since outsourced service providers have limited influence to change departmental processes by themselves.

Although there is a recognition that outsourced service providers depend on management support, the service providers/technical teams still have a role to play in terms of BPR. In particular, the data analysis identified the need to integrate such re-engineering into the systems development methodology that G2G follows. Thus re-engineering cannot be seen as a side activity but should rather be seen as an intrinsic part of the entire systems development process. This then highlights the need for technical teams to understand the business processes of the department, and to also possess skills in the re-engineering of business processes.

It was therefore evident in the data analysis that the re-engineering of business processes

works both ways. Management must provide direction, support and participation in the technical aspects of re-engineering that G2G introduces, and simultaneously technical teams must understand, advise and support the business changes introduced by G2G.

This component of DEG indicates that challenges may be introduced, since end-to-end service re-engineering may pose questions about the relevance of existing agencies. This challenge did not emerge clearly in the data analysis and may therefore be assumed to be irrelevant to the KZN DoT as this stage.

However, a related issue that DEG highlights is that the changes proposed by e-Gov may extend beyond the current incumbent's term in office. The data analysis supported this view, indicating that support from management may be politically linked, since the administration in government changes every five years. Thus, if the new management or political leadership do not provide the support for G2G that was provided by the previous administration, efforts to achieve end-to-end service re-engineering may grind to a halt.

There were also issues identified in the data regarding particular individuals' 'term of office'. What emerged was the heavy reliance on individuals to drive G2G, and once those individuals left the department (through resignation or retirement) then G2G tended to stall. Thus the need for support from business which goes beyond one individual, and the need for systems development methodologies to ensure effective knowledge management, became apparent in the data analysis.

6.3.2.4 Digital Era Governance summary

Dunleavy et al. (2005) describe DEG as a post-NPM public management model. This model comprises three themes, and within each theme there are several components. These components have been interpreted in relation to the data analysis conducted in this research. Some of the components of DEG can be viewed as foundational, identifying what DEG must achieve within a department and thus providing the basis for e-Gov strategy. Other DEG components describe how e-Gov must be implemented in a department. This research has expanded on these components by identifying several challenges that could be encountered in the implementation of the component, with particular emphasis on G2G. The data analysis has also found that some components of DEG may only become relevant at a later stage, once G2G has been effectively implemented within the department and therefore enabling inter-department G2G. Finally, the remaining DEG

components can be seen as high-maturity components which will only be achieved once inter-departmental G2G has been implemented effectively.

The data analysis has therefore taken the components of DEG and plotted them against a maturity curve, comprising four maturity levels: foundational, G2G implementation, inter-departmental and high maturity. This maturity curve is shown in Figure 71. The maturity curve, together with the interpretation of the components of DEG in relation to the data analysis, may prove useful to public-sector managers and stakeholders involved in G2G, as it provides a systematic approach to viewing and implementing DEG in the public sector. Some of the DEG components did not find any direct mapping to the data analysis (Roll-back of agencification, Network simplification and Client-based or needs-based organisation), whilst some DEG components did map back to the data analysis but were not supported by the field data (Re-governmentalisation, Radical squeezing of production costs, procurement concentration and specialisation). These DEG components are still shown on the maturity curve and are marked with an asterisk (*). Their positioning on the maturity curve is, however, an assumption that requires further research.

	1 - FOUNDATIONAL	2 - G2G IMPLEMENTATION	3 - INTER DEPARTMENTAL	4 - HIGH MATURITY
RE-INTEGRATION			Roll back of agencification*	
		Joined up government		
				Re-governmentalisation*
		Reinstatement of central processes		
				Radical squeezing of production costs*
		Re-engineering back office functions		
				Procurement concentration and specialisation*
			Network simplification*	
NEEDS BASED HOLISM			Client based or needs based organisation*	
	One stop provision			
	Interactive and "ask once" information seeking			
	Agile government processes			
			Data warehousing	
		End to end service re-engineering		
DIGITIZATION PROCESSES	Electronic service delivery			
	New forms of automated technologies			
				Radical disintermediation
		Active channel streaming		
				Facilitating isocratic administration and co-production
	Moving toward open book government			

KEY:

	Indirect mapping to data analysis: Management Support & Resistance
	Indirect mapping to to data analysis: Strategy
	Direct mapping to data analysis
	No mapping to data analysis evident

* Positioning on maturity curve is assumed, further research needed

Figure 71. Digital Era Governance components maturity curve

6.3.3 e-Government conceptual framework

Schedler and Scharf (2001) developed an e-Gov conceptual framework from the perspective of NPM. The framework attempts to understand e-Gov in the context of public management and focuses on non-technical issues. Three process elements of e-Gov are identified: electronic democracy and participation (eDP), electronic production networks (ePN) and electronic public service (ePS). Additionally, the impact of culture on e-Gov is established and three management techniques relevant to the functioning of e-Gov are highlighted in the model (knowledge management, process redesign and quality management).

This conceptual framework is discussed in section 2.5.3.3 and is repeated below (Figure 72) for reference purposes.

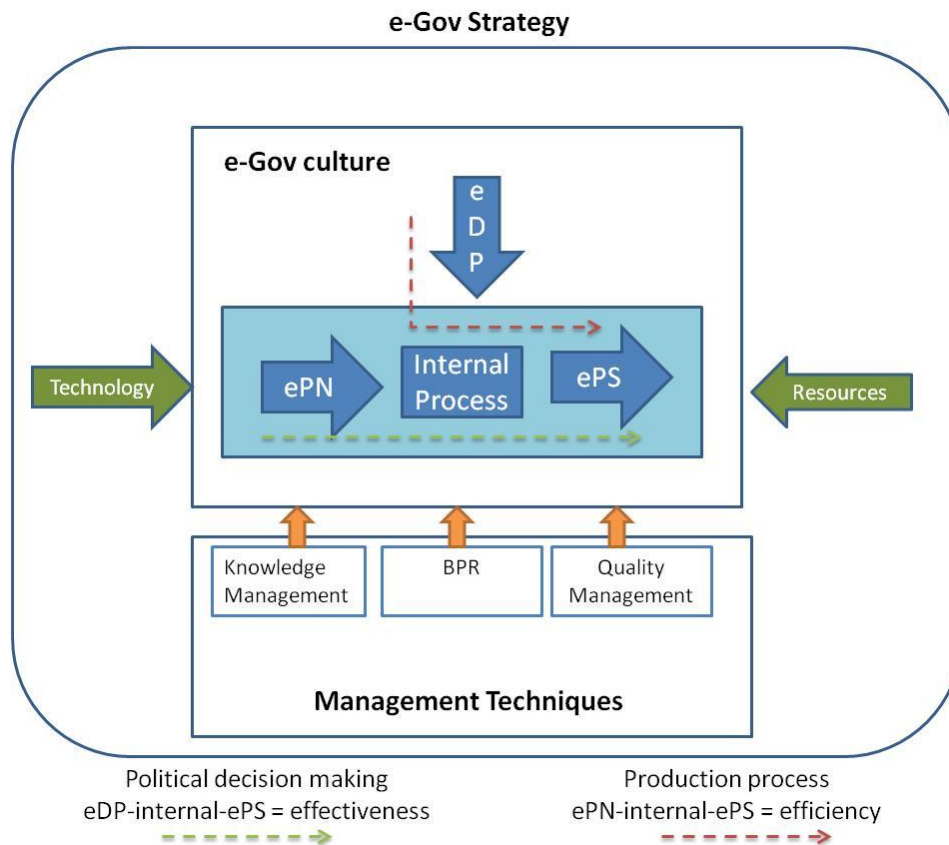


Figure 72. e-Government framework (adapted from Schedler and Scharf, 2001) — repeated for reference purposes

Several aspects of the data analysis in this research can be related to the Schedler and Scharf (2001) model. In so doing, the data analysis helps extend the Schedler and Scharf model, whilst also assisting to interpret the data analysis findings. Figure 73 below maps the data analysis to the

model, and thereafter each mapping is discussed in detail together with the implications and interpretations of such mappings/relationships between the data analysis and the model. The purple ellipses indicate the findings from the data analysis, and the purple arrows relate these data findings to applicable components of the Schedler and Scharf model.

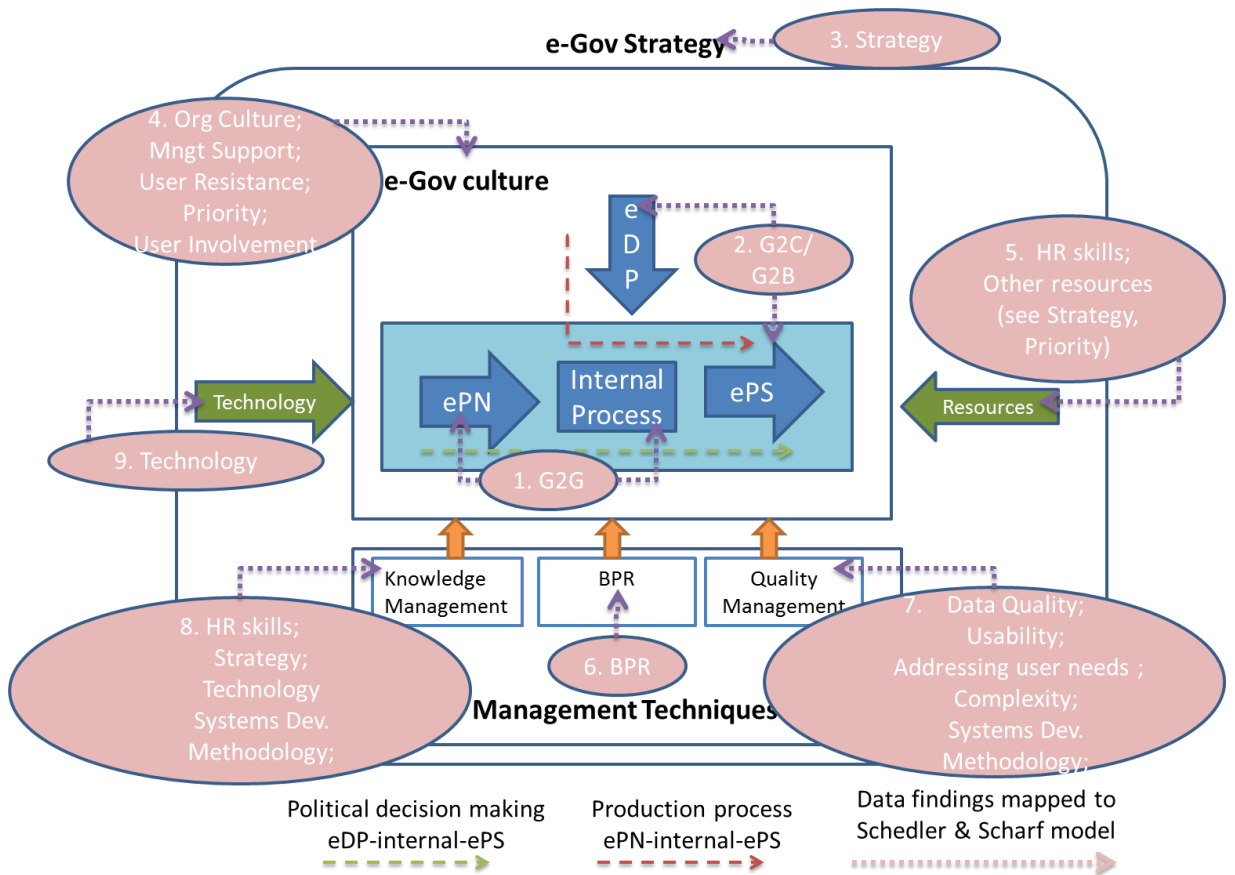


Figure 73. Mapping data findings to Schedler and Scharf e-Gov conceptual model

(1) ePN and Internal Process: The Schedler and Scharf model identifies ePN as the electronic production network that supports the execution of internal processes, where internal processes may encompass the business processes executed with a government department or across government departments. Some authors view ePN as a pure description of e-Gov (Abrahams, 2009; Mukonza, 2014). Thus ePN and Internal Process as shown in the model can be viewed as synonymous with G2G. One difference, however, is that the model seems to indicate that ePN may be executed and other (manual) internal processes are executed sequentially thereafter. The data findings have cautioned against such an approach, indicating the need to integrate G2G (or ePN) into the business processes. The danger of not doing so, as highlighted in the data analysis, is

that G2G may be bypassed and manual processes favoured if users are given a choice between the two. This in turn leads to poor user adoption of G2G and poor data quality.

Therefore, although some business processes, or parts of a business process, may remain manual, there is a need to take a holistic view of the business process. G2G must be integrated into the business process and not viewed as a stand-alone, optional extra or by-product of a manual process.

The data analysis thus supports the removal of “Internal Process” from the Schedler and Scharf model as internal processes are either embedded within G2G (ePN), or if internal processes remain manual then the manual processing is well interfaced with the automated processes.

(2) ePS and eDP: Electronic Public Services (ePS) and Electronic Democratic Participation (eDP) support provision of government services to citizens and/or businesses through electronic means. Some authors describe this as e-Governance within which e-Gov exists as a sub-set (Abrahams, 2009; Mukonza, 2014). ePS and eDP can, however, be seen as synonymous with G2B and G2C, since they support the provision of government services to citizens and/or businesses through electronic means. Although G2B and G2C did not form part of the scope of the study, the Schedler and Scharf model supports the views expressed in this research, i.e. that G2G (ePN) is foundational in enabling G2B and G2C (ePS, eDP).

The Schedler and Scharf model also indicates a linear flow between eDP–internal process–ePS (political decision-making process) and a linear flow between ePN–internal process–ePS (production process). Based on the data findings, it may be assumed that these flows are not necessarily linear and may in fact be cyclical. For example, ePS may flow back into ePN in the case where a citizen submits a request to book a driver’s license test. ePS provides the facility to conduct the booking whilst ePN will make the actual booking, reserve the seat for the applicant and possibly conduct certain pre-screening. The ePN–internal process–ePS (production process) seems to support a one-way transactional relationship, where government departments may “package” certain information or services and provide them online for a citizen to make use of without any further interface with the department.

Similarly, the eDP–internal process–ePS (political decision-making process) described in the model may be seen as inadequate. The outcomes of electronic democracy and participation (eDP) may not only affect how electronic services are provided to citizens (ePS), but may also directly affect how a department executes its internal processes (ePN). Taking a strategic view of e-Gov, ePS and ePN may also inform and influence eDP, as the data produced from ePS and ePN can be used by departments to assess the changes required to policies and obtain citizens’ input into such changes.

The Schedler and Scharf model supports the view in this research that G2G is a foundational requirement for enabling other forms of e-Gov, such as G2C and G2B. The data analysis has also identified a gap in the Schedler and Scharf model, as the linear political decision-making process and linear production process that the model supports is limiting, and does not fully exploit the potential of e-Gov. It is therefore suggested that the relationships between ePN, eDP and ePS are cyclical, facilitating two-way transactional relationships between these forms of e-Gov.

Conceptualising the use of ICT in the public sector according to a common framework has been problematic. This is due to the use of different terminology and taxonomy applied in the discipline of e-Gov (G2C, G2B and G2G), and terminology and taxonomy applied in the discipline of public administration (Schedler and Scharf, 2001; Abrahams, 2009; Mukonza, 2014). Both disciplines, however, are describing the same thing and this interpretation is useful in bridging the gap between the use of ICT in the public sector as conceptualised by e-Gov, and the conceptualisation by public administration.

(3) e-Gov strategy: The Schedler and Scharf model highlights the need for an e-Gov strategy; however, it does not expand on this in any detail. The data analysis may be useful in supplementing the model, as it has identified *strategy* as a requirement for successful e-Gov implementation. *Strategy* emerged as a sub-theme of G2G User Adoption and various aspects related to *strategy* have been identified and discussed in detail in Chapter 5. In summary these include:

- The need to develop a strategy highlighting the role of e-Gov in the department. The strategy must clearly indicate how e-Gov enables service delivery and must emphasise the priority for implementation.
- The need for the strategy to set the tone for support from management and end users of e-Gov.
- The requirement for a provincial strategy describing how e-Gov will be applied across provincial departments. Emphasis must be placed on data sharing, reuse of systems and moving away from silo operations in government departments.
- The importance of using the strategy to identify how newer technologies will be assessed and deployed in the department, as well as making adequate provision for planning and implementing the technical infrastructure that is required to support e-Gov.

(4) e-Gov culture: The impact of Organisational Culture on G2G was clearly identified in the data analysis and presents different challenges to G2G. The Schedler and Scharf model, however, goes further to indicate that organisational culture is one of the biggest obstacles facing successful

implementation. The model emphasises four dimensions of organisational culture: publicising politics and the administration, customer orientation, trust culture and technology disposition.

These dimensions may help understand some of the findings in the data analysis better. One of the issues that emerged in the data was that user resistance may be motivated by reasons other than problems with the effectiveness and efficiency of the G2G system. Thus, the data analysis seemed to indicate that users may have ulterior motives for not wanting to utilise G2G, although these specific ulterior motives were not clearly apparent. The model highlights that one reason may be that e-Gov publicises politics and the administration, making government processes more transparent whilst also making information more easily accessible, and thus lessens the ability to reshape or manipulate data. Thus, the model indicates that there may be shifts in power if the availability of information is seen to provide a power advantage.

The trust culture is highlighted in the model as an important dimension of organisational culture as it establishes collaboration between government departments. The data analysis supported this finding, indicating that government departments have historically focused on meeting their own needs with little incentive to share data and systems. The need for support from management to establish this trust culture within the department and across different government departments emerged in the data analysis. Similarly, technology disposition is another component of the model related to Organisational Culture. The data analysis has indicated that users of G2G find it difficult to move out of established comfort zones which are usually paper-based processes. In addition, it emerged that management's lack of understanding of technology or aversion to technology may also contribute to the poor disposition towards technology.

(5) Resources: Contextual variables are identified as an area of future research in the model. Although there is no definition in the model of what constitutes a contextual variable, it may be assumed that the authors of the model were referring to Resources, since there is no further explanation of Resources in the model either.

The data findings are therefore useful in providing insight into the Resource requirements for e-Gov:

- **Human resources:** The data analysis has indicated the need to identify the correct skills and adequate number of human resources to increase the likelihood of G2G user adoption. These included both business human resources and ICT technical human resources. In terms of skills, expertise with business process re-engineering, knowledge management, change management, strategic planning and the business of the department (i.e. transport) emerged as significant requirements. The need to assess and plan for the human resource requirements to participate in the G2G project and to utilise/operate the system from a

business perspective, and the need to assess and plan for the human resource requirements to support and maintain the system from an ICT perspective, were important considerations.

- **Funding:** Funding can also be seen as a resource requirement for G2G and the data analysis indicated that lack of funding can impact the successful adoption of G2G. The need for the e-Gov strategy to be in place so that funding can be allocated, the need to give e-Gov the appropriate priority so that it can compete for funding with other business imperatives, and the need for management support to allocate funding came across clearly in the data analysis. Inadequate funding has led to systems being partially implemented or implemented and then not being supported or maintained. Without the necessary support and maintenance, the systems tend to fall into disuse.

(6) Business process re-engineering: The model indicates that although BPR may optimise business processes and increase productivity, there is a limit to which this can be applied in the public sector. There may still be a need to apply case-based reasoning, where the process to follow may differ from one case to another; hence, reliance on particular individuals can never be completely eliminated by introducing a G2G system. This view of case-based reasoning can be used to explain the finding in the data analysis that where there has been a heavy reliance on particular individuals to implement G2G, and when these individuals are no longer available, the G2G system tends to fall into disuse. Thus these individuals possess specific knowledge on how to deal with specific cases, and this knowledge has not (or cannot) be incorporated into the G2G system. Another related issue from the data analysis is the ability to address user needs effectively in a G2G system. The data analysis highlighted the difficulties in addressing user needs. The Schedler and Scharf model offers one possible explanation since applying this case-based reasoning means that the G2G system must make provision for a variety of possible processing scenarios. The model can also explain why user needs change so much during a G2G project; as new cases emerge during the course of the project, users realise that the system must now cater for these processing scenarios that had not previously been thought of. However, such flexibility in modifying a G2G project scope is limited, since public-sector procurement often indicates a fixed-scope contract and limits the extent to which the scope may vary.

The model identifies several complexities in BPR supported by G2G. These include the need to consider political, legal, professional and economic implications, the fact that it is not always possible to start with a “clean slate” approach, and a fundamental rethinking in terms of processes, whilst government departments are often organised in terms of labour specialisations. These issues did emerge to an extent in the data analysis; thus, the model supports the findings in that complexity affects the effectiveness of BPR efforts.

The data analysis may also offer some extensions to the model in relation to BPR. For example, G2G must be integrated into business processes to ensure that the systems are used. If users are offered an alternative process and are able to bypass the system, then user adoption is less likely. Related to this is the need for management support to enforce the transition from manual to automated processes introduced by G2G. The need for skills in BPR from business and technical professionals emerged clearly in the data analysis, as well as the need for systems-development methodologies to consider and make provision for BPR.

(7) Quality management: Quality management in the model is concerned with the efficiency, effectiveness and adequacy of public services. Various quality dimensions are identified with a strong customer orientation; thus the focus of the quality concerns are on the services provided to the customer. G2G supports customer orientation and thus contributes to the quality of public services provided to citizens. It can therefore be concluded that G2G contributes to the quality concerns identified in the Schedler and Scharf model.

However, the data analysis takes a different view of quality concerns and hence may extend how quality is conceptualised in the Schedler and Scharf model. The data analysis is concerned with quality in the development and implementation of G2G; if these quality concerns can be addressed, then the quality of the public services that G2G supports can be optimised. Viewed differently, if G2G is of poor quality then the quality of public services is also likely to be poor.

Several different aspects of quality emerged in the data analysis. Firstly, the systems-development methodology must make adequate provision for ensuring that quality is maintained. This could include, for example, rigorous software-testing procedures and implementing quality gates in the development life cycle. Secondly, the related issues of usability and G2G data quality may pose quality concerns. Usability of a G2G system is a measure of quality of the system, if the system is too difficult to use, then the user adoption is likely to be poor. Similarly, data quality must be maintained for the G2G system to be seen as adding value to the business. Data, however, has different quality concerns; from a system design and development perspective there needs to be provision for conducting data checks and validation to minimise human error and incorrect data inputs. From a user perspective there needs to be end user discipline and management support to ensure that users capture data correctly and in a timely manner.

The data analysis also identified the need to address the G2G user's needs so that G2G adoption is more likely. Thus, addressing user needs can also be viewed as a quality measure, although the data analysis did highlight issues around addressing user needs, which included having too many users with different opinions on what the system must do and how it should do it, users themselves not knowing what their actual needs are, or the user needs changing several times

during the course of the G2G project. These issues, however, are not new to systems development and should be dealt with as part of the systems development methodology. It can therefore be concluded that addressing user needs will increase G2G user adoption, and hence contribute towards a higher quality of public service provision.

Finally, the data analysis highlighted issues related to the complexity of G2G which may impact on its quality. Complexity in addressing user needs has been discussed above. However, other issues related to complexity are introduced by outdated technology landscapes, outsourcing arrangements, poor knowledge management and differing business processes. Thus, complexity may affect the quality of G2G. It may, however, be assumed that appropriate considerations in the systems development methodology to identify and deal with these complexities, may provide mitigation for these quality risks.

(8) Knowledge management: The Schedler and Scharf model focuses mainly on two aspects of knowledge management: managing implicit knowledge in individuals as tasks that they performed are now automated by e-Gov and these individuals move on to other tasks; and sharing knowledge within a government department to support the organisational changes that e-Gov introduces.

The data analysis extends these concepts. One of the clear relationships that emerged was the impact of knowledge management on human resources and skills. Effective knowledge management is required to maintain and enhance the skills of individuals involved in e-Gov. This is supported by the model; however, the data analysis emphasises the importance of effective knowledge management and skills development especially due to staff turnover over time. The data analysis indicates that knowledge management is not being practised effectively, making it difficult for new staff to take over e-Gov-related functions both in terms of business skills (end users of G2G) and technical skills (development and maintenance of G2G).

The data analysis also emphasised the importance of knowledge management being incorporated into the strategy for e-Gov, thus ensuring that it receives the attention it deserves. Similarly, the data analysis emphasised the need to integrate knowledge management into systems development methodologies. One of the examples that draws attention to the lack of knowledge management is that there are some G2G systems in place that are now defunct, since there is no knowledge on how to utilise or maintain the systems. In order to avoid a repetition of these issues, there is a need to ensure that the development methodology makes provision for adequate system documentation (such as analysis, design, and implementation documents) so that handovers can take place as staff turnover occurs. A related concern is the public-sector procurement model, which creates the likelihood that different service providers may be involved in different parts of the same G2G project, thus making it even more important for effective knowledge management to take place.

Finally, knowledge management in terms of technology or technical infrastructure (such as servers, networks and operating systems) was also an important data finding. The data highlighted that often the technical staff involved in implementing and managing the technical infrastructure have the know-how and skill but do little to formalise this knowledge or share the knowledge. This not only presents a challenge when staff turnover occurs, but also when the specific individual is unavailable. A frequent example of such a situation is when only one person knows how to maintain a server: when the server goes down and the one person that knows how to fix it is on sick leave, the department's core business operations come to a halt. Although knowledge management related to technical infrastructure can be treated in the same way as other types of knowledge management related to G2G, it has the ability to have a significant impact on the department and hence deserves even more attention.

(9) Technology: Although Technology appears in the Schedler and Scharf model, there is no explanation of its role and impact. In fact, the model states that it focuses only on non-technical issues and hence the impact of technology on e-Gov can be seen as a specific exclusion in the scope of the model.

The model does, however, locate technology as a peripheral issue in relation to the implementation and utilisation of e-Gov. This view is congruent with the data findings, since Technology Infrastructure was seen to have important effects on G2G, yet these effects were not viewed as a core theme affecting G2G User Adoption.

The data findings regarding Technology Infrastructure, as discussed in section 5.8, can therefore supplement the Schedler and Scharf model. The effects of Technology Infrastructure in terms of availability of infrastructure, access to the Internet and the impact of government networks (including the various relationships to G2G User Adoption sub-themes), provide an extension to the model, and assist in understanding the effects of Technology Infrastructure on e-Gov.

6.4 ASSESSING THE FINDINGS AGAINST THE LITERATURE

Chapter 2 provided a review of the literature related to User Adoption, Complexity, HR Skills and Technology Infrastructure. In this section, the literature review from Chapter 2 is mapped to the findings that emerged from the field data analysis.

Table 22 provides an overview of how the literature review maps to the field data's central theme, main themes and sub-themes. An explanation of this mapping, together with the literature review reference, is provided. The table also provides a count of the number of literature review domains (User Adoption, Complexity, HR Skills and Technology Infrastructure) that mapped to the field data findings. In qualitative research, counts are used to provide evidence for analytical reasoning

(Miles et al., 2014). Thus, this table provides a basis for concluding whether or not the literature supports the field data findings.

It can be seen from Table 22 that the field data central theme, all the main themes and all the sub-themes are supported by at least one reference in the literature review. With regard to the relationships that emerged in the field data between main themes and sub-themes, this mapping of the literature review has produced results similar to the mapping of theories to the field data findings (discussed in the preceding section). The literature review has provided limited support for the relationships between themes and other themes/sub-themes as presented in Table 23. Out of a total of 34 relationships identified from the field data, only seven relationships were supported by the literature review. For the remaining 27 relationships in the field data, no support or evidence of these relationships was found in the literature review.

Table 22. Summary of data analysis: central theme, main themes and sub-themes compared to the literature review

LITERATURE REVIEW → FINDINGS: DATA ANALYSIS ↓		USER ADOPTION (UA)		HR SKILLS		COMPLEXITY		TECHNOLOGY INFRASTRUCTURE (TI)		Totals
		Overview	Reference	Overview	Reference	Overview	Reference	Overview	Reference	
G2G Central Theme	User Adoption (UA)	UA affects e-Gov success; different issues related to UA identified in literature	Braa & Hedberg, 2002; Ndou, 2004; Ciborra, 2005; Ebrahim & Irani, 2005	Adequate skills must be in place for UA of e-Gov (number and types of skills); training and retention of skills also important	DPSA, 2001; Ndou, 2004; Ebrahim & Irani, 2005; Kumar & Best, 2006; Dada, 2006; Heeks, 2008; PMG, 2012; The Presidency, 2010	Various forms of complexity may affect e-Gov and present challenges in UA	Ciborra, 2005; Daniels & LaMarsh, 2007; Heeks, 2008	Without the TI e-Gov cannot be used effectively. Hence TI affects UA	Schware & Deane, 2003; Ndou, 2004; Dada, 2006;	4
	Addressing User Requirements (AUR)	AUR is an important factor for UA of e-Gov	Kayed et al., 2010			Complexity exists in analysing & understanding UR	PMG, 2003; Ciborra, 2005; PMG, 2012			2
G2G User Adoption Main Themes	Business Process Management (BPR)	Business process must be changed to improve chances of UA	Ebrahim & Irani, 2005; Ciborra, 2005							1
	Change Management (CM)	Different types of CM interventions required for UA of e-Gov	Ndou, 2004; Ciborra, 2005; Hossan et al., 2006							1
	User Involvement (UI)	UI affects adoption	Braa & Hedberg, 2002; Ciborra, 2005							1
	Organisational Culture (OC)	OC may be a barrier to UA	Ndou, 2004; Ebrahim & Irani, 2005							1
	Priority	Ownership and commitment required for UA; champion must be identified	Hossan et al., 2006							1
Technology Infrastructure Main Themes	Availability of Technical Infrastructure (TI)					TI may introduce complexities, e.g. different platforms, incompatibilities	Ciborra, 2005	Inadequate TI is a challenge for e-Gov	Schware & Deane, 2003; Ndou, 2004; Dada, 2006; AGSA, 2008	2
	Government Networks							Adequate networking required; affordability is also a concern	Schware & Deane, 2003; Ndou, 2004; Chen, 2006	1

LITERATURE REVIEW → FINDINGS: DATA ANALYSIS ↓		USER ADOPTION (UA)		HR SKILLS		COMPLEXITY		TECHNOLOGY INFRASTRUCTURE (TI)		Totals
		Overview	Reference	Overview	Reference	Overview	Reference	Overview	Reference	
G2G User Adoption Sub-themes	Strategy			Strategy for staff retention should be in place	DPSA, 2001	Strategy to deal with complexity related to different levels of systems maturity & transition from existing systems	Ciborra, 2005	Appropriate telecomm. policies, regulatory environment & legal framework required for e-Gov success	Schwartz & Deane, 2003; Ciborra, 2005; Gulati et al., 2012	3
	Usability	A usable system increases likelihood of UA	Braa & Hedberg, 2002; Ciborra, 2005			Complex systems may affect usability	Ciborra, 2005; Daniels & LaMarsh, 2007			2
	Complexity	Organisational complexities may affect UA	Matavire et al., 2010			Various types of complexities identified which affect e-Gov and present challenges	Ciborra, 2005; Chen et al., 2006; Daniels & LaMarsh, 2007; Heeks, 2008; DPSA, 2008			2
	Resistance	Resistance can affect UA	Ndou, 2004; Ciborra, 2005							1
	System development methodologies			Plans must be in place to cater for staff turnover — methodology could address	Ebrahim & Irani, 2005	e-Gov architecture, database design & programming languages can introduce complexity — methodology could address	Ciborra, 2005			2
	Management Support	Support from management affects UA	Ndou, 2004; Ciborra, 2005; Hossan et al., 2006							1
	HR skills			Lack of adequate skills presents challenges to e-Gov	DPSA, 2001; Heeks, 2008; Ndou, 2004; PMG, 2012; The Presidency, 2010					1
	Data quality					Quality of data may introduce complexity to e-Gov	PMG, 2003; Ciborra, 2005; AGSA, 2008			1

Table 23. Summary of data analysis: mapping of themes to other themes/sub-themes compared to the literature review

LITERATURE REVIEW FINDINGS: DATA ANALYSIS		USER ADOPTION		HR SKILLS		COMPLEXITY		TECHNOLOGY INFRASTRUCTURE		Totals	
		Overview	Reference	Overview	Reference	Overview	Reference	Overview	Reference		
THEMES mapped to SUB-THEMES	Addressing User Requirements	Business Process Management								0	
		User Involvement								0	
		HR skills								0	
		Resistance								0	
		Systems dev. methodologies								0	
		Complexity	Complexity related to hierarchical structures makes it difficult to understand what users require from e-Gov	Matavire et al., 2010			Complexity may be introduced in addressing user requirements	PMG, 2003; Ciborra, 2005; PMG, 2012			2
		Strategy								0	
	Business Process Management	Change Management (CM)								0	
		Usability								0	
		Complexity								0	

LITERATURE REVIEW FINDINGS: DATA ANALYSIS		USER ADOPTION		HR SKILLS		COMPLEXITY		TECHNOLOGY INFRASTRUCTURE		Totals
		Overview	Reference	Overview	Reference	Overview	Reference	Overview	Reference	
Change Management (CM)	HR skills									0
	Systems dev. methodologies									0
	Management support									0
	Data quality									0
	Business Process Management	CM needed to improve chances that business processes are effectively changed	Ebrahim & Irani, 2005; Ciborra, 2005							1
	User Involvement									0
	HR skills			HR skills dev. & training may be seen as a form of CM	Ndou, 2004; Kumar & Best, 2006; Dada, 2006					1
	Systems dev. methodologies									0
	Management support (MS)	MS required for effective CM	Hossan et al., 2006; Heeks, 2008; The Presidency, 2010; PMG, 2012							1
	Data quality									0

LITERATURE REVIEW FINDINGS: DATA ANALYSIS		USER ADOPTION		HR SKILLS		COMPLEXITY		TECHNOLOGY INFRASTRUCTURE		Totals
		Overview	Reference	Overview	Reference	Overview	Reference	Overview	Reference	
User Involvement										
	Business Process Management									0
	Change Management									0
	HR skills									0
	Resistance	Lack of user involvement may cause resistance	Braa & Hedberg, 2002; Ciborra, 2005							1
	Systems dev. methodologies									0
	Management support									0
	Data quality									0
Organisational Culture	HR skills									0
	Resistance	Organisational culture may cause resistance	Ndou, 2004; Ciborra, 2005							1
	Systems dev. methodologies									0
	Management support									0

LITERATURE REVIEW FINDINGS: DATA ANALYSIS		USER ADOPTION		HR SKILLS		COMPLEXITY		TECHNOLOGY INFRASTRUCTURE		Totals
		Overview	Reference	Overview	Reference	Overview	Reference	Overview	Reference	
Priority	Data quality									0
	Management support	Management must give e-Gov priority to increase user adoption	Hossan et al., 2006; Heeks, 2008; The Presidency, 2010; PMG, 2012							1
	Strategy									0

KEY:	
Central theme	
Main theme	
Sub theme	
D	Direct Match
P	Partial Match

6.5 INTERPRETATIONS

In this section, interpretations are drawn after evaluating how the literature review and theories support or relate to the findings from the field data.

6.5.1 Central theme

User Adoption is the central challenge facing G2G in the KZN DoT. The field data has shown that users' reluctance to use G2G presents a challenge to the Department. This in turn makes it difficult for the benefits of G2G to be realised.

According to the Public Management model, maintaining line of sight between the technology implemented and the specific environment comprising suppliers, competitors, regulators and/or consumers, is a critical success factor in user adoption of the technology. Various literature sources (Braa and Hedberg, 2002; Ndou, 2004; Ciborra, 2005; Ebrahim and Irani, 2005) have also supported User Adoption as a challenge facing G2G.

Thus, User Adoption is appropriately positioned as the central challenge, since the intended objectives of G2G and e-Gov can never be realised if G2G is not used by the intended user base.

6.5.2 Main themes

In trying to understanding User Adoption better, the concept of User Adoption was expanded based on the literature review. Five main themes were identified in the literature as types or forms of User Adoption challenges related to G2G: *Addressing User Requirements*, *Business Process Management*, *Change Management*, *User Involvement* and *Organisational Culture*. The field data has confirmed that all five of the main User Adoption themes that emerged in the literature review present challenges to G2G in the KZN DoT.

One more User Adoption-related theme, *Priority*, emerged from the field data. Whilst this theme was not initially identified in the literature review, the literature was revisited after the field data analysis. Evidence was found in the literature supporting *Priority* as a User Adoption-related challenge facing G2G. Theoretical support was also found in the Factor Model for two of the six main User Adoption themes. The Public Management model has helped to develop a better understanding of these main themes by using the components of the model to explain why these themes present challenges to G2G. Similarly, the data findings have contributed to the Public Management model by highlighting certain components of the model that require updating to

address the needs of e-Gov (i.e. skills, functions and management application components of the Public Management model).

The challenge of User Adoption is therefore multifaceted and is affected by other challenges. These include *Addressing User Requirements, Business Process Management, Change Management, User Involvement, Organisational Culture* and *Priority*. A summary of the interpretations is shown in Table 24. The table highlights how each of these main themes presents a challenge to G2G and how it affects G2G.

Table 24. Summary of interpretations — Main themes

Main theme	Summary of interpretations
Addressing User Requirements	<p>Not addressing user requirements presents a challenge to G2G.</p> <p>If user requirements are addressed, the likelihood that a G2G system will be adopted by users is higher.</p> <p>Complexities in addressing user needs (including the changing needs of users) must be addressed by a systems development methodology.</p> <p>Users and technical staff must have the correct skill sets to define user requirements effectively.</p> <p>Users may sometimes be resistant to providing the requirements due to a lack of buy-in. Frustration may also set in where users are required to deal with different ICT consultants over a period of time in order to document and analyse the requirements of G2G.</p> <p>The Public Management model highlights the importance of maintaining line of sight between the requirements of the G2G system and how G2G will support the consumers, suppliers, competitors and/or regulators.</p> <p>A strategic perspective of user requirements must be taken, considering the entire landscape of G2G and how specific requirements fit into the landscape. This perspective is important to ensure data reuse, system functionality reuse, elimination of duplicate systems and moving away from silo operations.</p>

Main theme	Summary of interpretations
<p>Business Process Management</p>	<p>Lack of effective business process management, for those processes impacted by G2G, presents a challenge to G2G.</p> <p>The impact of G2G on business processes must be established. Either the business process or the G2G system must be changed to improve the chances of user adoption.</p> <p>Business processes are fragmented, where users each work on a part of the process and do not realise the implications up/downstream. This can impact on the overall effectiveness of G2G if one part of the system is not used appropriately, especially in terms of the quality of the data produced by the system.</p> <p>G2G must be integrated into the business processes and cannot be a stand-alone or optional solution which can be bypassed by users.</p> <p>Business process re-engineering may be limited in the public sector due to the prevalence of case-based reasoning, i.e. many variations of the business processes based on individual conditions (Schedler and Scharf, 2001). This also makes defining the user requirements complex and increases the complexity of G2G.</p>
<p>Change Management</p>	<p>Lack of change management presents a challenge to G2G.</p> <p>Change management must be implemented to improve the chances of G2G user adoption.</p> <p>Even though change management is important, it is not implemented effectively on G2G projects, thereby contributing to poor user adoption.</p> <p>Change management, as a core skill in the Public Management model, must incorporate managing the changes introduced by G2G.</p> <p>User groups can serve as a means of change management as users are part of the process of growing, evolving and adapting G2G to the business environment.</p> <p>High-quality data can become a form of change management, as the user sees the value of G2G in its contribution to the business functions.</p>

Main theme	Summary of interpretations
User Involvement	<p>Lack of user involvement presents a challenge to G2G.</p> <p>User involvement increases the likelihood of G2G adoption. It also leads to users being more understanding and patient when there are G2G system-related issues.</p> <p>Users with the correct skill sets must be identified and included as part of G2G projects. This involvement must extend into the system maintenance phase after the system is implemented.</p> <p>Users' knowledge of the data and business processes can assist with designing effective G2G systems. This is particularly important where knowledge exists in specific individuals and has not been formally documented or is not easily available elsewhere.</p>
Organisational Culture	<p>An organisational culture that is not conducive to the implementation of G2G may present a challenge to G2G.</p> <p>If the organisational culture is open to change and embraces technology, then G2G adoption will be higher.</p> <p>A structured approach to effective organisational culture management is required, such as the Organisation development management application in the Public Management model.</p> <p>The Schedler and Scharf conceptual e-Gov model highlights technological disposition and the creation of a trust culture as important enablers of an organisational culture for effective G2G.</p> <p>Reluctance to use G2G with no consequence management, poor user discipline in using G2G (e.g. not keeping the system up to date) and repeated "bad" experiences with using G2G (e.g. system is repeatedly down when needed by the user) can easily develop into an organisational culture around G2G.</p>
Priority	<p>If G2G is not given adequate priority, this may present a challenge to G2G.</p> <p>G2G must be given the appropriate level of priority to improve the chances of the system being successfully adopted by users.</p>

Main theme	Summary of interpretations
	Line of sight must be maintained between the G2G system and the consumers, suppliers, competitors and/or regulators that the system ultimately supports.

6.5.3 Sub-themes

The field data was examined to understand each of the six main challenges better. Eight sub-themes emerged from the field data. These sub-themes were *strategy*, *usability*, *complexity*, *HR skills*, *resistance*, *systems development methodology*, *management support* and *data quality*. Both the literature and the theories employed have supported the positioning of these sub-themes as challenges facing G2G.

The field data, together with the literature and theoretical foundations, has provided a rich interpretation of how the eight sub-themes have an impact on and present challenges to G2G. This is summarised in Table 25.

Table 25. Summary of interpretations — Sub-themes

Sub-theme	Summary of interpretations
Complexity	<p>Complexity exists in analysing and documenting user requirements, as well as dealing with diverse business processes across the environment.</p> <p>Lack of knowledge management, outsourcing of G2G, outdated technologies and incompatible technologies also introduce complexity.</p> <p>Procurement processes in the public sector may result in multiple service providers working on different parts of the same project, hence increasing complexity (e.g. design, development and support may each be done by a different service provider over a period of time).</p>
Systems development methodology	Systems development methodologies must be in place. The methodology must improve the chances that the appropriate G2G design and architecture will be defined, appropriate users identified, change management planned for and implemented, business process

Sub-theme	Summary of interpretations
	<p>changes addressed, and system documentation produced. Changing user requirements must be managed by the methodology, as well as the ability to effectively enhance and optimise the system over time.</p> <p>The methodology should also improve the chances that provision is made for the support of G2G post-implementation, considering that there may be staff turnover.</p> <p>There is a need to provide better assurance that an agreed methodology is being adhered to by the parties concerned.</p>
Resistance	<p>The culture of the organisation may affect G2G, especially where decisions are made at the top level without user involvement.</p> <p>Effective user involvement may reduce resistance; however, mechanisms must be in place to address competing or contradictory views and requirements from users.</p> <p>Reasons for user resistance may not necessarily be related to the G2G system directly (e.g. not wanting to create visibility of workloads and transparency in processes). The Schedler and Scharf conceptual e-Gov model supports this interpretation, indicating that resistance may emerge since G2G can publicise politics and the administration, make government processes more transparent, make information more easily accessible and lessen the ability to reshape or manipulate data. Effective change management is required to understand the reasons for user resistance, and support from management is required to counter resistance.</p> <p>Lack of buy-in from users results in resistance, whereby users do not contribute to defining the requirements of G2G.</p>
Skills	<p>Adequate types of skills and number of resources must be in place for successful G2G implementation. The types of skills required are technical and user skills. These include skills in BPR, articulating and documenting user requirements, implementing change management, designing technical requirements for G2G and making system changes to G2G effectively.</p>

Sub-theme	Summary of interpretations
	<p>The reliance on consultants, changes in resources, outsourcing of G2G, and heavy reliance on specific individuals pose challenges to G2G.</p> <p>Appropriate training must be provided for G2G throughout the life cycle of G2G, and not only at implementation.</p> <p>The core skill set defined in the Public Management model must emphasise the specific skill requirements of G2G.</p>
Strategy	<p>An overall strategy for the implementation of G2G is required. The strategy must provide a roadmap for each of the systems in the landscape.</p> <p>The strategy should also address how HR skills will be provided, how transitions to new systems will be addressed, and how technology infrastructure requirements will be met.</p> <p>Strategy must consider the operating conditions in government, especially in terms of the demands/constraints imposed by procurement processes and related turnaround times.</p> <p>Strategic management, as a management application in the Public Management model, must be applied to guide the development and implementation of a G2G strategy.</p>
Management support	<p>Management must serve as a driver of G2G, ensuring that there is an awareness of the value of G2G, and enforcing the transition from manual processes or existing systems to G2G. They need to be involved in G2G personally, provide direction for G2G, improve the chances of an adequate budget being available and improve the chances of change management being effectively implemented.</p> <p>Management must prioritise G2G in relation to current staff workloads, and support from management should be part of the organisational culture in order to be most effective.</p>

Sub-theme	Summary of interpretations
Data quality	<p>High-quality data can improve users' confidence in G2G, whilst user involvement in G2G can assist with improving data quality during the implementation of G2G.</p> <p>The culture of the organisation influences discipline with respect to G2G usage, which in turn affects data quality. In order to improve data quality, G2G must be embedded in business processes.</p> <p>High-quality data provided by G2G can contribute to effective policy analysis as described in the Public Management model, in effect contributing to better policy development and implementation in the public sector.</p>
Usability	<p>User-friendly designs must be considered to increase the likelihood of user adoption.</p> <p>Systems with high usability will lead to more effective execution of business processes using G2G, as users understand how their processes are automated and the effects of using/not using the system effectively.</p>

6.5.4 Relationships between themes and sub-themes

The field data identified eight sub-themes and also identified relationships between the main themes and sub-themes. These relationships were first presented in Chapter 5 and are shown again in Figure 74.

Although the literature review supported the existence of the sub-themes as challenges facing G2G, limited support for the existence of relationships between the main themes and sub-themes was provided in the literature review. The literature has provided support for seven out of a total of 34 relationships identified during the data analysis, whilst the theories supported six out of a total of 34 relationships.

Thus the relationships between themes and sub-themes as identified in the field data are seen as useful for developing a deeper understanding of the challenges facing G2G. However, these relationships are not viewed as significant enough to be incorporated into the final interpretations. The researcher believes that these relationships are not necessarily complete and in fact each main

theme could be related to each sub-theme. *Change Management* is a good illustrative example since the field data did not highlight a relationship between *Change Management* and *resistance*. However, change management is an approach that attempts to overcome resistance.

Relationships between themes and sub-themes that were identified in the field are therefore discounted in the final interpretations. This is based on the limited support provided by the literature and theories, as well as the researcher’s view that the relationships identified are not necessarily complete.

		G2G User Adoption Sub Themes							
		Strategy	Usability	Complexity ¹	Resistance	System development methodologies	Management Support	HR Skills ¹	Data Quality
G2G User Adoption Main Themes	Addressing User Requirements	x		x	x	x		x	
	Business Process Management		x	x		x	x	x	x
	Change Management					x	x	x	x
	User Involvement				x	x	x	x	x
	Org Culture				x	x	x	x	x
	Priority ²	x					x		

NOTES:

1. G2G challenge as per original research question, which has emerged from field data as a sub theme of user adoption
2. New main theme related to user adoption which has emerged from field data

Figure 74. Government-to-Government User Adoption — Mapping of main themes and sub-themes

6.5.5 Technology infrastructure

The availability of technical infrastructure and inadequate government networks are the two Technology Infrastructure-related challenges that emerged from the field data. However, the field data has shown that Technology Infrastructure-related challenges, including the solutions to addressing these challenges, are clearly defined. The solution to addressing the availability of technical infrastructure is to purchase additional infrastructure, whilst the solution to addressing government network constraints is to upgrade the bandwidth. The South African national broadband policy (DoC, 2013b) and the implementation plan for providing broadband Internet access to government departments and citizens (DTPS, 2014b) provide further support for the assertion that challenges around Technology Infrastructure are well known, and that there are policies and plans in place to address these Technology Infrastructure challenges at a national level. It is the issues underlying Technology Infrastructure that give rise to the challenges. Hence, although Technology Infrastructure affects G2G, Technology Infrastructure in itself is viewed as a less important challenge.

The field data provided evidence for Technology Infrastructure affecting the sub-themes; however, there was inadequate evidence for Technology Infrastructure directly affecting the central theme of User Adoption or any of the User Adoption main themes (i.e. *Change Management, Business Process Management, User Involvement, Addressing User Requirements, Organisational Culture or Priority*).

The literature review has provided strong support for Technology Infrastructure as a challenge facing G2G. Availability of technical infrastructure and government networks are components of the Factor Model. Similarly, various literature sources have provided support for the challenges that Technology Infrastructure poses to G2G. The Schedler and Scharf (2001) e-Gov conceptual model also supports the impact of Technology Infrastructure on G2G. In addition, the model situates Technology Infrastructure as a peripheral consideration (as opposed to a central consideration) of G2G, which is congruent with the findings in this research.

Although the Technology Infrastructure-related challenges and solutions are clearly defined, the overall conclusion is that Technology Infrastructure is acknowledged as a challenge facing G2G. This is based on the field data findings that the issues underlying Technology Infrastructure present challenges to G2G. Similarly, the literature review and theories support Technology Infrastructure as a challenge facing G2G. Technology Infrastructure does not, however, directly affect User Adoption of G2G. Instead, Technology Infrastructure has an impact on, and must be considered by, the User Adoption sub-themes (summarised in Figure 57).

6.5.6 Other considerations

This section describes challenges to G2G that may not have explicitly emerged in the field data; however, by analysing the data through Public Management theory, these challenges became clearer. The field data therefore provide evidence for these challenges whilst the Public Management theory helped to shape and form interpretations of the field data.

6.5.6.1 Departmental e-Government policy

Analysing the field data through DEG has produced a DEG maturity curve. This maturity curve confirms the foundational requirements of how G2G will be applied within the department; it thereafter highlights how G2G can be applied to enhance public service delivery as G2G is implemented in the department. Finally, a longer-term view of G2G is established, highlighting the intention for G2G and value that it will provide to the department as it moves into support for inter-departmental business processes and eventually supports high-maturity DEG concepts.

In the KZN DoT, the department's commitment to G2G and how it will be applied to benefit the department to achieve its mandate, has not been formalised. e-Gov and G2G may be understood and accepted by stakeholders as a means of improving service delivery, but it has not been formalised. This formalisation should take place in the form of a departmental policy on e-Gov, where the policy confirms the extent to which the DEG maturity curve is relevant to the department. In terms of the Public Management model, this e-Gov policy should clearly describe the role of e-Gov in relation to analysis of departmental policies (where policy analysis is concerned with generating information for optimal policy decisions, analysing policy content, analysing policy systems, analysing policy issues and analysing policy outcomes). Thus the departmental e-Gov policy formally bridges the gap between e-Gov and the business of the department.

The lack of a departmental e-Gov policy may be the reason for or contributor to some of the other challenges identified in the data analysis. This includes, for instance, the main theme of *Priority* and sub-themes of *management support* and *resistance*. G2G cannot be assigned appropriate priority since an e-Gov policy formally establishing the role of e-Gov in the department's context is not in place. Similarly, the e-Gov policy can be useful in providing management support and overcoming resistance which was described in the data analysis.

The departmental e-Gov policy must be differentiated from the broad e-Gov policy of the South African government (DPSA, 2001). Abrahams (2009) describes the DPSA policy as a broad frame within which individual departments can set their own policies; it also serves as the framework for the delivery of e-Gov services within the individual department. An analysis and evaluation of the South African national e-Gov policy is beyond the scope of this study; however, various shortcomings of the national policy have been identified by other researchers (Abrahams, 2009). The departmental e-Gov policy discussed here is instead specific to the department's context, and clearly articulates the role of e-Gov within the department. It would ideally need to be aligned to the national e-Gov policy.

The departmental e-Gov policy must also be differentiated from *strategy*, which emerged as a sub-theme in the data analysis. The departmental e-Gov policy focuses on the highest level of management commitment to e-Gov and on the intent for integration of e-Gov into public management, whereas the strategy for e-Gov focuses on how the policy will be implemented in the department.

Several perspectives have been identified by Abrahams (2009) that can be applied in the development of future e-Gov policies. These perspectives align well with the research findings

and the discussion of departmental e-Gov policy presented above. In particular, Abrahams (2009) highlights:

- **e-Enablement:** the need to explicitly articulate how e-Gov will contribute to government service delivery and the development challenges in the country. This is equivalent to the first two phases of the DEG maturity curve dealing with the foundational requirement of e-Gov in the department and the contribution to the enhancement of service delivery.
- **Role of citizen, stakeholder and small business:** identifying and discussing challenges from the citizen and stakeholder perspective. This is also addressed by the first two phases of the DEG maturity curve, which specifies how e-Gov will become a foundational capability serving the needs of the department's stakeholders.
- **Capacitation of public-sector personnel:** ensuring that personnel are equipped to develop, implement, support and leverage e-Gov. The HR skills requirements have emerged as a sub-theme in the research findings. It is therefore necessary to integrate the skills and capacitation requirement of e-Gov into the departmental e-Gov policy;
- **Innovation:** clarifying roles and responsibilities around the innovative use of e-Gov for service delivery. This can be seen as part of the e-Gov strategy that the department develops, which should clearly define the innovation path that will be followed. However, at the same time skills must be developed to encourage a culture of innovation within the department, as well as ensure that processes are in place to nurture innovation from concept to implementation. Thus, innovation in the department must be articulated in the e-Gov policy;
- **Holistic e-Gov:** a coherent whole is required for ways of thinking about e-Gov. The departmental e-Gov policy and strategy will serve as this coherent whole within the departmental context. It moves beyond individuals or specific sections in the department working individually with regards to e-Gov, and starts taking a department-wide view of e-Gov. Finally, the latter two phases of the DEG maturity curve, concerned with inter-departmental e-Gov and high maturity, extend the concept of holism beyond the department. It views government holistically across the province and eventually at a national level. This enables business process and data sharing across government departments. Importantly, the data findings indicate that this holism starts within the department and expands outwards.

A departmental e-Gov policy therefore emerges as an important requirement for e-Gov success and the lack thereof can be a contributor to or cause of some of the challenges identified in the

field data. The departmental e-Gov policy is not the same as the national e-Gov policy, and neither is it the same as the e-Gov strategy which was discussed as a sub-theme.

6.5.6.2 Quality management framework

Quality management was identified in the Schedler and Scharf e-Gov conceptual model and was concerned with the efficiency, effectiveness and adequacy of public services. In addition, the data findings highlighted various G2G quality-related considerations and can therefore be seen to extend the Schedler and Scharf model in terms of quality considerations.

A need for an overarching G2G quality management framework emerged in the data analysis. This quality management framework addresses certain specific quality dimensions such as how well the systems development methodology addresses G2G quality, maintaining G2G quality by managing user requirements, ensuring the quality of G2G data and usability of G2G to promote overall G2G quality, and finally dealing with potential complexities that may threaten the quality of G2G. The section below discusses each of these quality dimensions in detail, which collectively can be viewed as an overall G2G quality management framework:

- **Systems development methodology:** The data analysis supported embedding the implementation of a quality management framework in the systems development methodology. Viewed differently, the methodology used to develop and implement G2G must ensure the appropriate quality of G2G. Thus, although the quality management framework may identify the quality requirements of G2G and metrics to assess quality, it is the systems development methodology that would need to ensure that the quality requirements and metrics are achieved.
- **User requirements management:** This provides the initial quality control measure by ensuring the requirements of users are correctly captured. As user requirements change during the course of the G2G project, the quality management framework must ensure that the implications of such changes are assessed (e.g. impacts on system components already developed) and thereafter respond appropriately to changes in user requirements (e.g. defer the changes or re-scope the project). In addition, the quality management framework must ensure that conflicting user requirements, poorly defined user requirements and unrealistic user requirements are dealt with.
- **Data quality management:** The quality management framework must deal with maintaining the quality of data, as often the systems cannot start on a clean slate and historical data is taken on by a G2G system. Involving users with intimate knowledge of the data may help in validating the accuracy of data taken on in the system. Data quality must also be viewed in

terms of how it is managed within the system for new data that is created. The need to look at the creation and maintenance of data as part of a holistic business processes emerged, thus ensuring that data quality is retained at each step in the process. This came across as important in the data analysis, especially in cases where users work only on a part of the process, and therefore do not realise the implications of poor data management on other parts of the business process. The need to apply a life-cycle approach to data management thus becomes apparent. Other data-quality considerations include the need for building validations into the system to restrict the input of incorrect or invalid data. User discipline and management support are also considerations for ensuring that data quality is maintained. Thus, although G2G can be designed and built to ensure data quality to a certain extent, there is also a need for this to be complemented with a commitment from stakeholders to data quality.

- Usability: G2G should cater for intuitive designs and simplicity in terms of how users are expected to interact with, operate and integrate the system into the business operations. This includes, for example, simple data-capture forms, using language that is commonly understood by business users as opposed to system jargon, and designing the flow of logic in the system in a way that can be easily comprehended by users.
- Complexity management: The quality management framework should ensure that sources of complexity in G2G are identified and mechanisms put in place to address these complexities. This is important because these sources of complexity may affect G2G quality. The data analysis identified outdated technology landscapes, outsourcing arrangements, poor knowledge management and differing business processes as potential sources of complexity to be dealt with. The quality management framework should thus assess whether such complexities are applicable to the G2G project at hand, to what extent they can affect the quality of G2G, and how the complexity will be managed.

6.6 SUMMARY

This research has shown that User Adoption is the central challenge facing G2G in the KZN DoT. User Adoption is influenced by six main themes: *Addressing User Requirements*, *Business Process Management*, *Change Management*, *User Involvement*, *Organisational Culture* and *Priority*. The six main themes in turn are influenced by sub-themes: *strategy*, *usability*, *complexity*, *HR skills*, *resistance*, *systems development methodology*, *management support* and *data quality*. The final model of the challenges of G2G in the KZN DoT is presented in Figure 75.

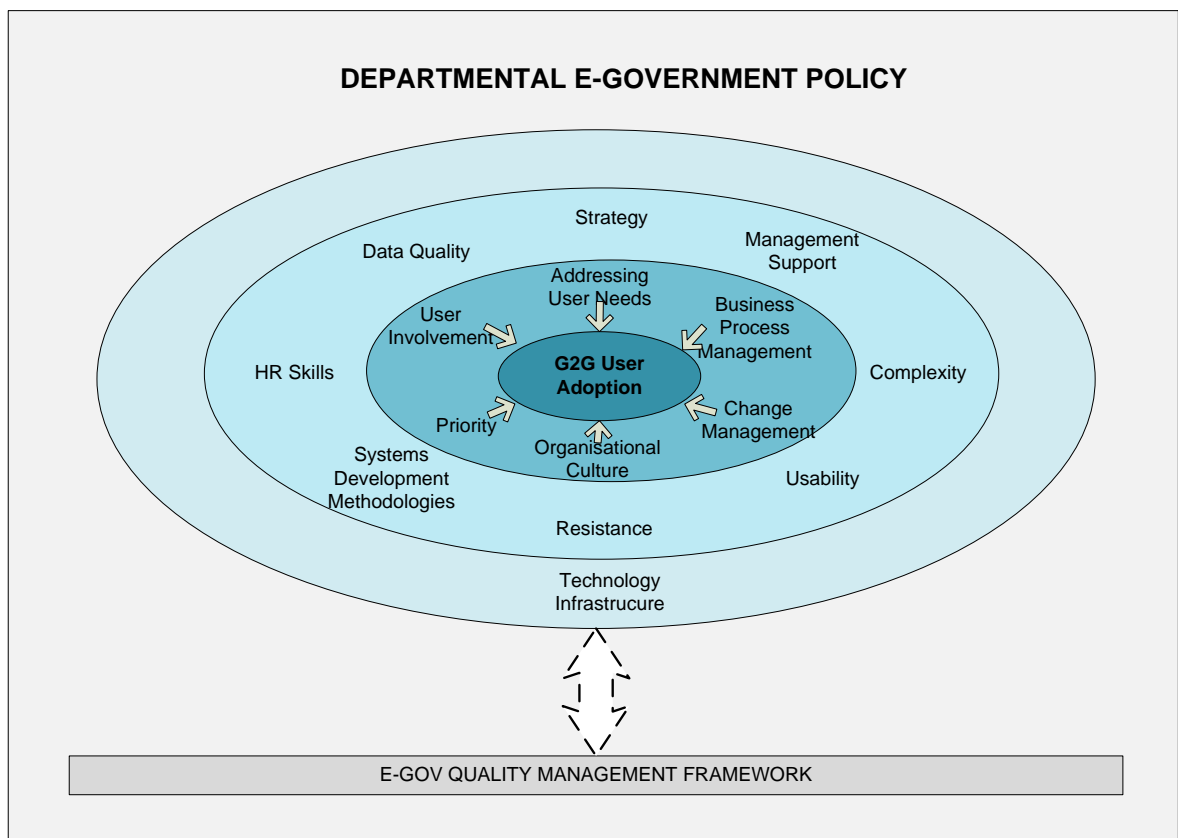


Figure 75. Final model — Challenges of Government-to-Government e-Government in the KwaZulu-Natal Department of Transport

The field data has identified relationships between main themes and sub-themes, which has provided a deeper understanding of both the themes and sub-themes. However, there is insufficient evidence in the field data to confirm the completeness and accuracy of the identified relationships. Thus, relationships between themes and sub-themes, although important in developing an understanding, have not emerged as significant in the final analysis.

Technology Infrastructure in itself emerged as a less important challenge facing G2G (as compared to the other research questions related to User Adoption, HR Skills and Complexity), since the issues related to Technology Infrastructure are well understood, as are the solutions that must be in place to address these issues. Thus, Technology Infrastructure in itself is seen as less important, but the issues underlying Technology Infrastructure give rise to it being viewed as a challenge.

Although Technology Infrastructure does not have an impact on the central theme of G2G User Adoption or on any of the six main themes, relationships have been identified between Technology Infrastructure and the sub-themes. The sub-themes are affected by Technology Infrastructure, and Technology Infrastructure affects the sub-themes. It is for these reasons that Technology Infrastructure is shown in Figure 75 within dotted lines, highlighting its peripheral nature in the overall conclusions.

Additional considerations for G2G are the *department e-Gov policy* and the *quality management framework for e-Gov*, both of which can be viewed as foundational for G2G success. The departmental e-Gov policy provides the framework within which e-Gov and G2G exist and can be useful in addressing the challenges related to the main theme of *Priority* and sub-themes of *management support* and *resistance*. The quality management framework is foundational in ensuring the appropriate level of quality for G2G and has highlighted different quality dimensions for G2G, related in particular to the main theme of *Addressing User Requirements*, and the sub-themes of *systems development methodology*, *data quality*, *usability* and *complexity*.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

This chapter concludes the research by examining how the field data has assisted in providing answers to the research question. The contributions of this research are discussed together with implications for public management. Thereafter, this research process is reflected upon. Finally, some of the limitations of this research and recommendations for future research are discussed.

7.1 CONCLUSIONS

7.1.1 Revisiting the research question

To conclude, the research question is revisited: *“How do the identified G2G challenges affect G2G in the KwaZulu-Natal Department of Transport?”* This research question set out to explore and obtain a deeper understanding of G2G challenges in the KZN DoT. Four specific challenges were kept in mind, informed by cases of these challenges in South Africa: User Adoption, HR Skills, Complexity and Technology Infrastructure. The research question viewed all four challenges as equally important at the outset; however, this research has shown that they are in fact not equally important and that they affect G2G in different ways.

The first sub-question asked was *“How does user adoption affect G2G?”* User Adoption has clearly emerged as the central challenge facing G2G. The next set of sub-questions asked *“How do human resource skills, complexity and technology infrastructure affect G2G?”* It has emerged from the research findings that HR Skills and Complexity are challenges facing G2G, and in fact affect User Adoption as well. Technology Infrastructure has in itself emerged as a challenge that is seen as less important, although the underlying issues related to Technology Infrastructure are important.

The final sub-question asked was *“What are the other challenges affecting G2G?”* Several other challenges emerged from the research findings, with different relationships and impacts. In particular, within the central challenge of User Adoption, six themes and eight sub-themes emerged. These themes and sub-themes have helped to develop a deeper understanding of G2G User Adoption, and in so doing have helped create a deeper understanding of the challenges facing G2G. By applying a conceptual framework comprising e-Gov and public management theories, it has been possible to explain and understand these challenges, themes and sub-themes

better. In addition, the need for a departmental e-Gov policy and the need for a quality management framework for e-Gov have emerged as foundational requirements for e-Gov and G2G success.

Thus the answer to the research question *“How do the identified G2G challenges affect G2G in the KwaZulu-Natal Department of Transport?”* can be seen in the final model of G2G challenges in Figure 75, which reveals an “onion-like” structure to the challenges. The researcher describes the model as “onion-like” as the challenges can be seen as analogous to peeling off layers of an onion. Sub-themes (the outer layer) must first be addressed. This is followed by the main-themes (middle layer), and finally the central challenge of G2G. It would seem that the central challenge of User Adoption will be addressed by default when the main themes have been addressed. Whilst Technology Infrastructure exists as a peripheral challenge, it has to be considered and incorporated into addressing the sub-themes. Thus, addressing the sub-themes would likely automatically address the Technology Infrastructure challenges. The departmental e-Gov policy and a quality management framework for e-Gov are seen as important requirements to support all the themes and sub-themes, as well as Technology Infrastructure. Although the model primarily provides a means of understanding G2G challenges, the structure that has emerged in the model may also provide a structure for addressing G2G challenges and planning G2G projects.

It is interesting to note that the central challenge of User Adoption, as well as the main themes and sub-themes, have a strong emphasis on what is often termed “softer issues”. This suggests a need to address people, management and procedural issues in order to improve the likelihood of G2G success. Technology Infrastructure may be viewed as a more “technical” issue and this has emerged as a peripheral challenge facing G2G. Thus, it would seem that the “softer issues” facing G2G must be given more attention. However, in the researcher’s experience in G2G and other systems projects, “softer issues” are often neglected, with the primary focus being on “technical issues”. This research highlights the need for a change in thinking and a change in approach to G2G which addresses “softer issues” first and then focuses on “technical issues”.

Although the need for a departmental e-Gov policy and a quality management framework for e-Gov emerged in the data analysis, it was public management theory that helped to interpret, shape and contextualise this need within G2G at a macro level. Thus, this research has made initial steps towards bridging the gap between public management and e-Gov. It has assessed real-life G2G project-related data in terms of public management theory, and has also used established public management theory to analyse and interpret this data.

7.1.2 Contributions of this research

As stated in Chapter 3, this research is based on an “Explanation” theory type as it aims to build new theory and promote greater insight and understanding into the phenomenon of G2G in South African provincial government (Gregor, 2006). For this type of research to constitute a contribution to knowledge, empirical evidence must be provided that describes as far as possible “what is” (Gregor, 2002). Addressing “what is” means that the dimensions or characteristics of the phenomenon should be provided as well as the structural interrelations between dimensions or characteristics (Gregor, 2002). This research has therefore contributed to e-Gov knowledge by identifying a model of the challenges facing G2G within a South African provincial government context. The model provides a deeper understanding of how these challenges manifest in provincial government as well as an understanding of the relationships between the different challenges. Gregor (2002) further provides criteria that can be applied to assess the contribution to knowledge:

- If a classification scheme is used to explain a phenomenon, then the scheme must be useful in aiding analysis in some way;
- Category labels and groupings applied should be meaningful and natural, and hierarchies of classifications may also be appropriate;
- Relationships between categories should be logical and the characteristics of such relationships should also be logical; and
- Important categories or elements should not be omitted from the classification scheme; it should be as complete as possible.

The researcher believes that the criteria to assess the contribution to knowledge as described by Gregor have been addressed. The classification scheme, category labels and groupings, and relationships that have emerged in the final model of G2G challenges is useful, meaningful and logical. In terms of completeness, the researcher believes that this model is as complete as possible within the context and constraints of this research. There are limitations discussed below that may affect the completeness of the model; however, based on the empirical data analysis, the model is believed to be complete.

From a practical perspective, this research can be useful to practitioners of e-Gov. It provides an approach to identifying the potential challenges that a G2G project may face, and, together with the field data analysis of the challenges, practitioners may develop strategies to understand the challenges better and implement mitigations where applicable. Important practical contributions of this study are as follows: firstly, it is current and focuses on what is happening at the present moment within South Africa; secondly, it is based on empirical data within a South African

provincial government context and hence deals with the issues, conditions and realities that South African provincial departments deal with; and finally, it is relevant due to its focus on the current South African government implementation of G2G as a means to enhance service delivery to citizens.

7.1.3 Implications for public management

7.1.3.1 Public management theory

Public management theory formed the basis of the conceptual framework for this study. It has helped interpret the findings from the field data; however, in the process there have been certain implications for public management theory that have emerged. Although the analysis of implications for public management theory was not a primary objective of this research, the implications that have emerged are useful to public management theory and are discussed briefly below.

- **Public Management model:** There is a need for a greater emphasis on the skills requirements of e-Gov and G2G in the Public Management model. Firstly, an emphasis is required on the technology dimension associated with the core public-sector skills requirements (in the skills component of the Public Management model), and secondly, the model must make provision for the technical skills required for G2G as part of the standard functions that exist in the Public Management model (in the functions component of the Public Management model). The technical skills required for G2G do not necessarily need to be incorporated into the Public Management model; however, as part of the functions in the Public Management model, public managers must ensure that the correct technical skills are in place.

The Public Management model identifies policy analysis as a management application in the model. Policy analysis has a dependency on information and also produces information as its output; hence, G2G has a role to play in policy analysis. Thus, the Public Management model requires an emphasis on the role of G2G in policy analysis.

- **Digital Era Governance:** DEG is a post-NPM public management model comprising three themes, and within each theme there are several components (Dunleavy et al., 2005). According to Mukonza (2014), DEG can be seen as the future of public management. This research suggests that the DEG model components be plotted against a maturity curve, comprising four maturity levels: foundational, G2G implementation, inter-departmental and high maturity.

“Foundational” components identify *what* DEG must achieve within a department and thus provide the basis for e-Gov strategy; other DEG components describe *how* e-Gov must be implemented in a department and are seen as “G2G implementation” components; “inter-departmental” DEG components refers to enabling inter-department G2G, which can only take place once G2G has been effectively implemented within the department; finally, the remaining DEG components can be seen as “high maturity” components that will only be achieved after inter-departmental G2G has been implemented effectively.

Although there is further research required, this research has suggested that the DEG model be updated to show the sequencing and dependencies between DEG components.

- **e-Gov conceptual framework:** This framework refers to an e-Gov conceptual framework developed from the perspective of NPM (Schedler and Scharf, 2001). This research has related the terminology used by the e-Gov conceptual framework (eDP, ePN and ePS) to the terminology used in e-Gov discourse (G2G, G2C, G2B). In so doing, initial steps have been made in bridging the gap between the domains of e-Gov and public management.

The research findings have helped to expand and update the e-Gov conceptual framework. In particular, the flows between eDP, ePN and ePS have been updated to show the dependencies that exist between different forms of e-Gov. There has also been a contribution to expanding and establishing a better understanding of the e-Gov conceptual framework’s components. Finally, this research has contributed to understanding three components of the e-Gov conceptual framework which exist in the framework without any further detail, and were identified as areas for future research. This includes e-Gov strategy, resource requirements of e-Gov and technology impacts on e-Gov.

7.1.3.2 The practice of public management

e-Gov exists within the public management domain. Thus the challenges facing G2G have an impact on public management whilst simultaneously public management has an impact on G2G. It is therefore useful to view the research findings within the context of public management, and the Public Management model is one way of presenting this contextualisation.

Within the specific environment of the Public Management model exists Supportive Technology and Techniques, and this is one and the same as G2G (i.e. utilising technology to support and enhance public service delivery). Thus the final model of G2G challenges from this research can be presented as part of Supportive Technology and Techniques in the specific environment as

shown in Figure 76. The general environment and the other components within the specific environment (Skills, Functions and Management Applications) have an impact on G2G and the challenges facing G2G. Similarly G2G and its challenges affect the general environment and the other components within the specific environment. The model of G2G challenges from this research has contributed to enhancing the understanding of Supportive Technology and Techniques within the Public Management model.

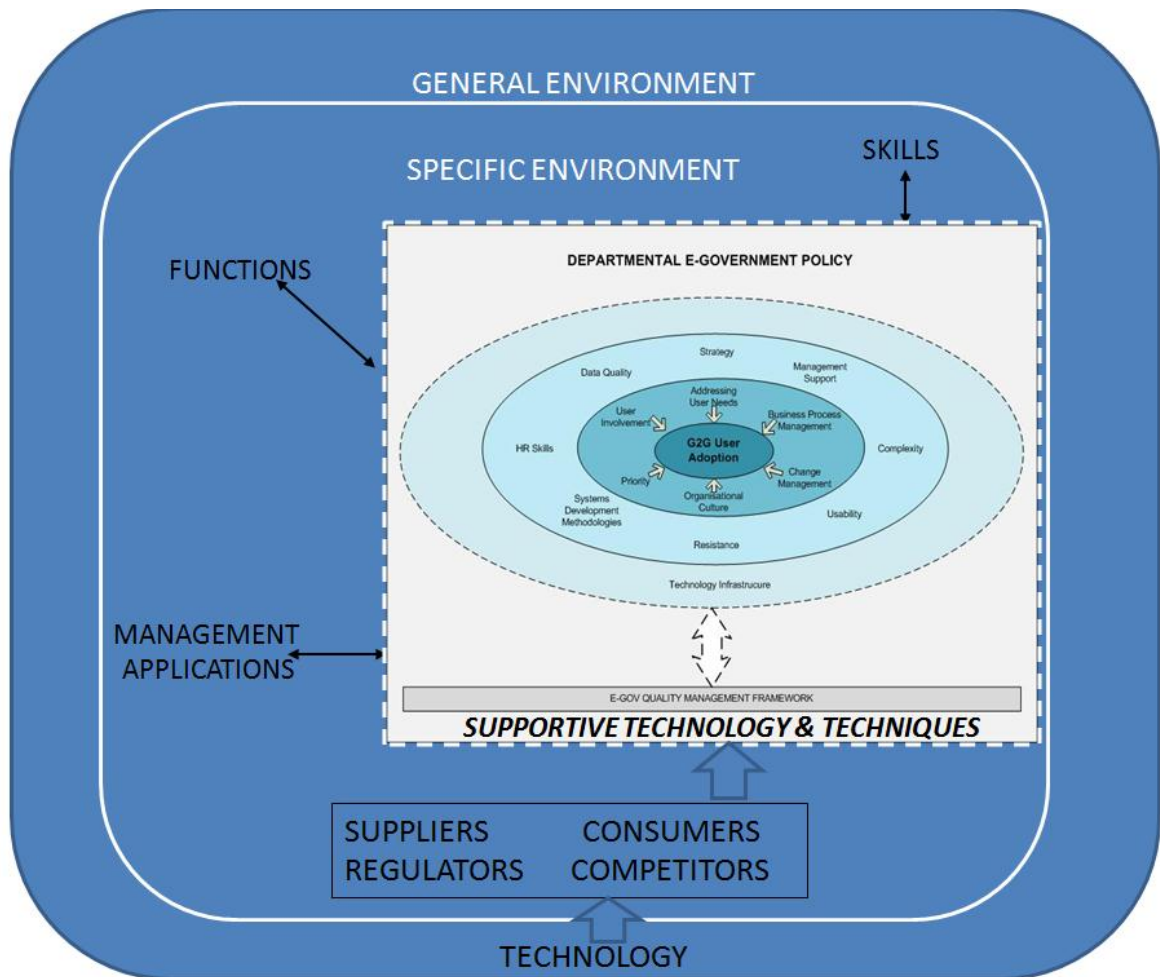


Figure 76. Contextualising the final model of G2G challenges within the Public Management model

Although different public management paradigms have emerged over time (from managerialism, to NPM, to DEG), the Public Management model has remained an enduring model that explains what public managers do and how they do it, independently of these changes in paradigm. During the paradigm changes, however, different components of the Public Management model have received emphasis (for example during NPM the “Suppliers” and “Consumers” components of the Public Management model were emphasised). This research has highlighted the central and

critical role at this point in time that technology, in particular G2G, plays in the public sector. Thus, it suggests that presently “Supportive Technology and Techniques” as identified in the Public Management model is a primary driver and enabler for the operations of the public sector. Mukonza (2014) also supports this view and indicates that ICT has become entrenched in the operations of government and that as technology advances globally, the usage of technology in the public sector can only increase.

This view of the centrality and criticality of ICT in organisations is confirmed by codes of good governance, such as the *King Report on Governance for South Africa 2009* and the *King Code of Governance Principles*, collectively referred to as King III (Institute of Directors Southern Africa, 2009a, b). King III escalates the responsibility for use of ICT in an organisation to the highest level; it highlights that ICT governance is the responsibility of the board of directors, with assistance from risk and audit committees. According to King III, the responsibility for implementing an ICT governance framework must be delegated by the board to management, whilst the board monitors and evaluates significant ICT expenditure and ensures that the organization utilises ICT resources effectively. In addition, ICT risk management must be integrated into a company’s risk management activities and ICT must be exploited appropriately to support and enable the business strategy, improve performance and add value to the organisation (Institute of Directors Southern Africa, 2009a, b).

The South African government has also recognised the importance and criticality of ICT and the governance of ICT, and has therefore endorsed and adopted the principles of King III. The Corporate Governance of ICT Policy Framework was approved for implementation in 2012 across government departments in South Africa (DPSA, 2012). In this Policy Framework, ICT is recognised as an enabler of government service delivery, and the highest accountable person in a government department, the Head of Department, is held accountable for the implementation of the Corporate Governance of ICT. All spheres of government, organs of state and public enterprises are required to comply with the implementation of the Policy Framework. Departments and entities were required to have an enabling ICT governance environment established (including policies, procedures and governance structures) in 2014, and by the present time (2015) ICT should have been strategically aligned with the business strategy of a department (DPSA, 2013).

This focus on good governance of ICT in the South African public sector is not surprising. According to Mukonza (2014), e-Gov is seen as the natural extension of good governance. With the complexity of business operations in government today, ICT is not only an enabler but a prerequisite for government departments to function effectively. For example, paper-based systems can no longer be used to process applications for government-funded old-age pensions

due to the sheer volume of applications, and the number of checks and balances that must be performed on each application. In addition, one application may need to be processed at geographically dispersed locations, sometimes simultaneously for maximum efficiency gains. Then there are also the security control measures that must be put in place to prevent fraud and corruption whilst also protecting sensitive and confidential government and citizen information. Finally, the need for government information sharing must be considered (with citizens as well as with other government departments), as well as the need for the types of good information management that are required to maintain effective records to ensure the transparency of government processes, to maintain auditability, and to report to all stakeholders on the performance and utilisation of government funding. It thus becomes apparent that in order for government to meet all these requirements, there is no present alternative to utilising ICT. Government departments must therefore ensure that ICT, like any other strategic resource, is governed effectively and used optimally.

This research has also confirmed the centrality of ICT in public governance and public management. G2G is an important enabler for government to meet its objectives, and at present there does not seem to be an alternative to G2G. The research therefore suggests that presently “Supportive Technology and Techniques” in the Public Management model must come to the fore and be given more attention and focus. The proposition by Mukonza (2014) that e-Gov is the future of public management, is therefore supported by this research. There is further research required to understand “Supportive Technology and Techniques” better and elaborate on its role in the modern-day Public Management model; there is also further research required to deepen the understanding of how “Supportive Technology and Techniques” impacts on other components of the Public Management model. This research has started to make initial progress in this direction by describing the challenges that G2G faces and by positioning G2G and its challenges within the Public Management model.

7.2 REFLECTIONS ON THE RESEARCH PROCESS

This section presents some of the researcher’s reflections on the research process. Although some of these reflections may be common to most researchers, they are discussed from a personal viewpoint and may therefore be useful for understanding how this research was undertaken.

The data analysis initially presented a challenge as the researcher was not quite clear on how it should be approached. Although several texts and online resources were consulted, none seemed to provide a concise “how-to guide” that was related to the type of research being undertaken. In addition, the lack of consistent terminology and interchangeable terminology used across different texts in qualitative data analysis made this process more difficult. The Framework approach

(Ritchie and Spencer, 1994) coupled with NVivo 10 resources, was a breakthrough as it provided a structured way of operationalising the data analysis. The researcher also recognised that there was a need to pick one text and its definitions, and apply those definitions to the study.

One of the concerns that persisted throughout this research was the need to maintain credibility, especially since this was a qualitative research project. This has been both a contributor to the research and also an inhibitor. On the one hand it has assisted in ensuring that conclusions made were linked directly to the field data and thus provided empirical evidence for the data findings. On the other hand, the researcher feels that it has restricted him to an extent in raising his own voice due to the need to remain cautious, sometimes excessively so, and within the bounds defined by the conceptual framework of the data and the research. This approach has also led to a somewhat repetitive writing style (especially in Chapter 5) due to the perceived need to explain analysis, reasoning and conclusions fully and comprehensively. It was only in the latter stages of writing that the researcher became aware that the writing style could have been less rigid. In summary, the researcher has found it difficult to establish a balance between discussing interpretations freely and also ensuring that interpretations are formulated on a sound empirical basis. It would, however, seem that this is a skill that is acquired over time, and one that cannot be easily taught or learned.

7.3 LIMITATIONS

Some possible limitations have been identified in this research and are discussed below.

This research is based on a case-study design, with the site being the KZN DoT. Thus the findings may not necessarily be applicable to other government departments in South Africa. This research has, however, attempted to provide a sufficiently thick description to explain the research findings so that readers may judge for themselves whether it is possible for the findings to be applied to their circumstances.

The research focused specifically on G2G. One of the reasons for this was the lack of prior research focusing on G2G. Another reason was the researcher's view that G2G is a foundational requirement for other forms of e-Gov to be successful. Thus, the findings from this research may not necessarily be applicable to other forms of e-Gov, such as G2C and G2B. However, again, the thick description of the findings may be used by readers to judge transferability for themselves.

It is acknowledged that the sequence of the interview questions, as shown in the research instrument in Addendum 2, may have had an impact on the research findings. In particular, the first research question was related to user adoption and interviewees may have answered this question the most fully, as they were freshest at the beginning of the interview. In addition,

interviewees may have unconsciously assumed that user adoption was the topic that the researcher was most interested in, as the question related to user adoption was asked first during the interview. Although the data analysis techniques used did not rely solely on the amount of time spent by interviewees discussing themes, the sequence of the interview questions is acknowledged as a potential limitation of this research.

By design this is a qualitative study and represents the interviewees' views and opinions at a specific point in time. It is acknowledged that other people not part of this research may have different views and opinions, and that the interviewees' views and opinions may change over time. These limitations are inherent in the nature of qualitative research, which aims to provide an in-depth understanding and not necessarily broad generalisations. However, to enhance the credibility of the interpretations of this research, all research findings have been assessed against literature and theories (Chapter 6) before any conclusions were drawn.

7.4 RECOMMENDATIONS

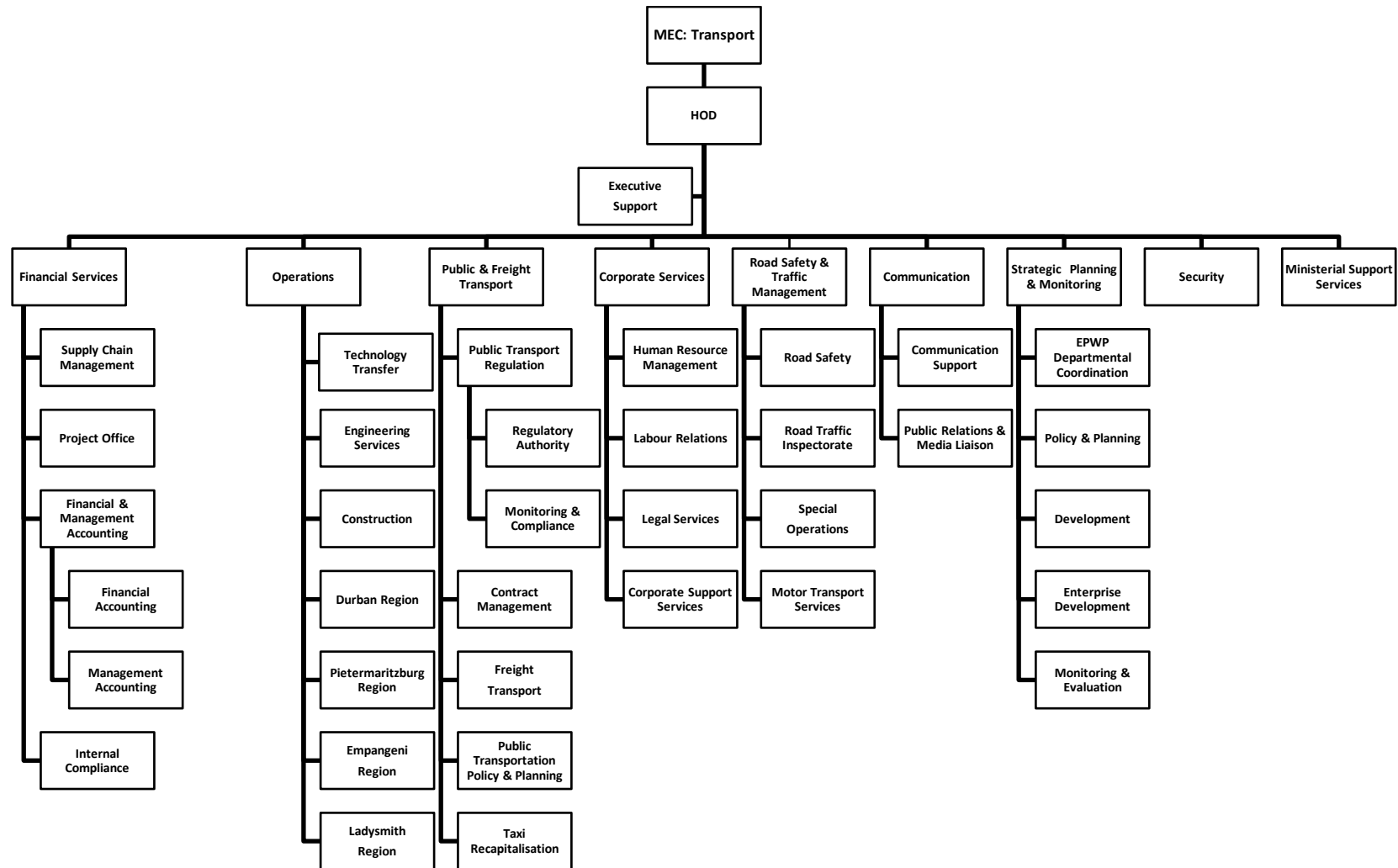
In this chapter the research question has been revisited, and the research contributions have been discussed, as well as the implications of this research for public management. The research process has been reflected on and some of the limitations outlined. To finally conclude, recommendations for future studies are discussed below.

- This research has provided insight into the challenges that HR skills and complexity present to G2G. It would be useful to investigate these two challenges further to understand the different types of HR skills and different types of complexity that affect G2G. These could then be presented as a taxonomy, so that practitioners could be made aware of the types of HR skills needed for successful G2G, as well as the types of G2G complexity that need to be planned for.
- New themes have emerged from this research as well as some themes that are less well established. These themes may be tested through a quantitative study.
- An interpretive analysis could be conducted according to the three respondent types (user, management and technical) in order to understand the different points of view of these G2G stakeholders.
- Some themes were “quietly voiced” in the research findings, such as imposing norms and standards, making G2G mandatory, and ensuring accountability for effective G2G implementation. These “harsher” themes can be contrasted with “softer” themes such as organisational culture and user involvement in G2G design and implementation. Further research may be undertaken to deepen an understanding of the contrasting means of improving user adoption.

- Related to the “quietly voiced” themes above, mechanisms for making G2G mandatory can be built into G2G systems, such as user surveillance through monitoring G2G usage and reporting on turnaround times for task completion on the G2G system. The research data could be used to explore the mechanisms for making G2G mandatory and how this may affect user adoption.
- The model of G2G challenges described in this research may be developed further to assist practitioners. For instance, a set of checklists or criteria could be developed for the themes and sub-themes, describing various characteristics of the themes and sub-themes. Practitioners could use the checklists or criteria to score the themes and sub-themes, and obtain a deeper understanding of each challenge in their specific G2G project context.
- Following on from the previous recommendation, a set of generic strategies could be developed to address the challenges. Using the checklists or criteria for each challenge, possible approaches to resolving the challenge may be suggested.
- This study has made some initial progress in applying public management theory to e-Gov and vice versa. There is further research required to understand in detail how each complements and challenges the other, as both disciplines are well established yet have developed relatively independently of each other. Studies based on both public management and e-Gov have often treated one of the two at a higher level, and have therefore not produced a tight enough integration between the disciplines of public management and e-Gov.
- Finally, comparative studies could be undertaken in other government departments so as to deepen the research findings.

ADDENDA

ADDENDUM 1: KWAZULU-NATAL DEPARTMENT OF TRANSPORT ORGANOGRAM



ADDENDUM 2: RESEARCH INSTRUMENT

The research instrument is adapted and based on Chaijenkij (2010), Matavire et al. (2010) and Faokunla (2012).

INTERVIEW PROMPT SHEET

DEMOGRAPHICS			
Gender	Age Group	Job Level	Organisation

1. Please list the G2G applications that you have been involved in over the past 5 years or that are currently underway and will be implemented in the next 5 years? Please also indicate the capacity that you have been involved in.

G2G applications - over past 5 years	G2G applications - Underway, to be implemented in next 5 years	Capacity

2. What were the reasons for implementing G2G?
3. What were the intended benefits of G2G?
4. Did **user adoption** affect implementation of G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.
5. *Use as probes, if not already addressed in preceding question.* Please elaborate on how the following aspects of **user adoption** affect G2G, if applicable.
 - a. User involvement and participation;
 - b. Changing of business processes;
 - c. Change management;
 - d. Organisational culture;

- e. Addressing user's needs in the requirements definition;
 - f. Other challenges related to user adoption;
6. Did **human resource (HR) skills** affect G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.
7. *Use as probes, if not already addressed in preceding question.* Please elaborate on how the following aspects of **human resource (HR) skills** affect G2G, if applicable.
- a. Type of skills required;
 - b. Quantity of skills required;
 - c. Staff retention;
 - d. Training;
 - e. Other challenges related to HR skills;
8. Did **complexity of G2G applications** affect G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.
9. *Use as probes, if not already addressed in preceding question.* Please elaborate on how the following aspects of **complexity of G2G** affect G2G, if applicable.
- a. Software engineering complexity;
 - b. Complexity in analysis of G2G requirements;
 - c. Compliance with legislation;
 - d. Environmental complexity;
 - e. Software integration complexity;
 - f. System security;
 - g. Technical complexity (existing systems, data quality, conversion of existing platforms);
 - h. Other challenges related to complexity of G2G applications;

10. Did **technology infrastructure** affect G2G in the KwaZulu-Natal Department of Transport?
Please indicate why and how.
11. *Use as probes, if not already addressed in preceding question.* Please elaborate on how the following aspects of **technology infrastructure** affect G2G, if applicable.
- a. Availability of technical infrastructure;
 - b. Telecommunications policy, regulatory and legal;
 - c. Access to internet;
 - d. Government networks;
 - e. Other challenges related to technology infrastructure;
12. Where there **any other challenges** that affected G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.
13. What will be the future direction of G2G in the KwaZulu-Natal Department of Transport?
14. Do you have any recommendations and suggestions regarding G2G in the KwaZulu-Natal Department of Transport? (If yes, please describe.)

ADDENDUM 3: GOVERNMENT-TO-GOVERNMENT CHALLENGES IN THE SOUTH AFRICAN GOVERNMENT

The table below identifies G2G challenges encountered in South Africa.

Description	Challenges encountered in G2G	Source
(1) Integrated Financial Management System (IFMS)	<p>The IFMS aims to integrate human resource, payroll, financial and supply chain management, and business intelligence in national and provincial government. Its objectives include replacing ageing technology and implementation of the Public Finance Management Act (Act No.1 of 1999 as amended by Act 29 of 1999) and the Public Service Act (Proclamation 103 of 1994 as amended by Act 30 of 2007). Cabinet memos 16 of 2005 and 22 of 2007 provided the approval to initiate this project. Expenditure to date is reported at R559 million (PMG, 2012), with more recent reports indicating that as much as R1,3 billion has been wasted without any noticeable outcomes (ITWEB, 2015).</p> <p>The following challenges have been identified in this project (PMG, 2012):</p> <ol style="list-style-type: none"> 1. Complexity of the IFMS programme 2. Procurement and contract negotiation processes taking longer than expected 3. Scope-related issues related to the additional responsibility of moving Phase III deliverables (acquisition and implementation of COTS products) to Phase II 4. Readiness and change-management issues of lead sites 5. Misalignment of product procurement and product development 6. Lack of functional skills in some departments, and lack of capacity. 	PMG (2012); ITWEB (2015)

Description	Challenges encountered in G2G	Source
(2) Durban Council's Community Information Link (DCIL)	<p>This project was initiated by the Durban Metro Council using an existing library network to provide web-based community and council information.</p> <p>The system was intended to provide a database of small for-profit businesses in the community. It also allowed for the capturing of CVs, vacancies, classifieds and sharing of information from the council. 40 public libraries were targeted and the librarians served as the content moderators. The pilot project was rolled out to 18 libraries with hardware and software costs of R2,27 million.</p> <p>There was little use of the DCIL, content was only in English and not in any other language, and the information from the council was not kept up to date.</p> <p>The key challenges were lack of HR capacity due to insufficient library staff. Another challenge highlighted was the lack of support and ownership from the highest levels in the library system, as well as a lack of support from within the Council.</p>	Heeks (2008)
(3) eNaTIS	<p>The Department of Transport developed the Electronic National Transport Information System (eNaTIS) over a period of five years (1 June 2002 to 11 April 2007), at a cost of R594 million. The main objective of eNaTIS was to centralise the management of the vehicle and driver's licensing records in South Africa. Fifteen databases of the previous system were migrated into one national database. The Auditor-General information systems audit report of 2008 on eNaTIS reported 12 significant findings that were still to be addressed or partially resolved (AGSA, 2008). This included:</p> <ol style="list-style-type: none"> 1. Project costs significantly exceeding the tender amount 	AGSA (2008); Naidoo (2007)

Description	Challenges encountered in G2G	Source
	<ol style="list-style-type: none"> 2. Inadequate infrastructure resulting in poor system performance 3. System and user manuals and procedures still required and enhanced support at provincial level 4. Security issues related to user access and segregation of duties, physical access control at eNaTIS data centres, disaster recovery site and backups not being tested, logical access controls, and database and operating system security 5. Data issues related to unresolved data errors that were transferred to the new system and lack of data migration documentation. <p>Scope changes resulting in significant overruns in terms of cost and implementation date were also noted (AGSA, 2008).</p>	
(4) Health information system (Comprehensive, high-cost electronic health record (EHR) systems)	Braa and Hedberg (2002) report widespread failure of high cost Health Information systems which “compete” with the Health Information System Program (HISP).	Braa and Hedberg (2002)
(5) Health information system (Eastern Cape Province)	In the Eastern Cape Province a unified monthly report was implemented as from January 1998, in all primary health care centres. The software application developed to capture and analyse data had significant limitations and was replaced by the District Health Information System (DHIS) software.	Braa and Hedberg (2002)
(6) Health information	A large hi-tech primary health care information project based on scanning of individual tick-sheets from all	Braa and

Description	Challenges encountered in G2G	Source
system (Free State Province)	patients' health services encounters in the Free State Province. Braa and Hedberg (2002) report that the project had a large provincial budget and received much attention; however, it ran into problems and was abandoned.	Hedberg (2002)
(7) Home Affairs National Identification System (HANIS)	<p>HANIS is the National Identification System for South Africa. It provides a population register, identity documents and a means to identify and verify individuals. The following challenges were described in PMG (2003):</p> <ol style="list-style-type: none"> 1. Complexity in scope and requirements 2. Complexity of procurement processes, with estimated costs of R1.455 billion for HANIS, R1.88 billion for the smart card ID, and R15 million estimated for a study to advise cabinet on a Public Private Partnership (PPP) 3. Concrete benefits of system not yet seen 4. Skills shortages 5. Lack of data. 	PMG (2003)
(8) HR Management System — Personnel Salary System (PERSAL)	<p>The Presidency (2010) highlighted challenges in the Personnel Salary System (PERSAL):</p> <ol style="list-style-type: none"> 1. Poor management of human resources in the public sector is attributed, amongst other reasons, to “dysfunctional and ineffective back-office systems” 2. Functionality was deemed to be lacking in the PERSAL system, negatively impacting on the public service ability to plan strategically around human resources 3. Data quality is highlighted as a challenge in the PERSAL system, with data clean-up projects planned 	The Presidency (2010)

Description	Challenges encountered in G2G	Source
	<ol style="list-style-type: none"> 4. The enhancement of skills and capacity was highlighted through training on system functionality and awareness campaigns on the system 5. Change management strategy was identified to create awareness of the project, its benefits and improve management and use of PERSAL. 	

ADDENDUM 4: OVERVIEW OF LITERATURE REVIEW

Category	Overview	Reference
USER ADOPTION	Lack of user involvement	Braa and Hedberg, 2002; Ciborra, 2005
	Business process changes	Ebrahim and Irani, 2005; Ciborra, 2005
	Change Management	Ndou, 2004; Ciborra, 2005; Hossan et al., 2006; Heeks, 2008; The Presidency, 2010; PMG, 2012;
	Organisational Culture	Ndou, 2004; Ebrahim and Irani, 2005; Ciborra, 2005
	Addressing user needs	Wing, 1990 Paetsch et al., 2003; Parrish, 2006; Matavire et al., 2010; Kayed et al., 2010;
HR SKILLS	Inadequate number of skills (related to capacity and availability) and types of skills	DPSA, 2001; Ndou, 2004; Heeks, 2008; The Presidency, 2010; PMG, 2012;
	Difficulty in retaining staff	DPSA, 2001; Ebrahim and Irani, 2005;
	Lack of training	Ndou, 2004; Kumar and Best, 2006; Dada, 2006; Auditor-General, 2008; The Presidency, 2010;
COMPLEXITY	Inherent software engineering complexity	Brooks, 1986; Daniels and La Marsh, 2007;
	Complexity in analysis of G2G requirements	PMG, 2003; Ciborra, 2005; PMG, 2012.
	Legislative complexity	Chen et al., 2006; Province of KwaZulu-Natal, 2008; Green Gazette, 2009; Green Gazette, 2011;
	Environmental complexity	Daniels and La Marsh, 2007; Heeks, 2008
	Complexity due to integration of systems	Ciborra, 2005; DPSA, 2008;
	Systems security related complexity	Ebrahim and Irani, 2005; Daniels and La Marsh, 2007; AGSA, 2008;
	Technical complexity related to legacy systems, quality of data, conversion of existing platforms.	PMG, 2003; Ciborra, 2005; AGSA, 2008; The Presidency, 2010;
TECHNOLOGY INFRASTRUCTURE	Availability of technology infrastructure	Schware and Deane, 2003; Ndou, 2004; EconStats, 2005; Dada, 2006; AGSA, 2008;
	Telecommunications policy, regulatory and legal	Schware and Deane, 2003; Ciborra, 2005; Gulati et al., 2012
	Access to internet	Schware and Deane, 2003; Ndou, 2004; World Bank, 2011
	Government networks	Schware and Deane, 2003; Ndou, 2004; Chen et al., 2006;
Principle Theories	UTAUT - Acceptance and Use of IT	Ventakesh et al. (2003)
	MMUST - Acceptance and Use of IT in a mandatory environment	Koh et al. (2010)
	Factor Model - e-Gov success and failure factors	Heeks, 2008
	ITPOSMO - Dimensions contributing to e-Gov success/failure based on design/reality gaps	Heeks, 2003

ADDENDUM 5: SAMPLE INTERVIEW TRANSCRIPT

INTERVIEW DETAILS:

Interviewee Name: Billy

Date and time conducted: 13/11/2013

Location: KZN DoT, PMB

DEMOGRAPHICS:

Gender: Male

Age Group: 50–60

Job Level: User

Organisation: KZN DOT

G2G INVOLVEMENT

IA:

Please list the G2G e-Gov applications that you have been involved in over the past 3 years or that are currently underway and will be implemented in the next 3 years? Please also indicate the capacity that you have been involved in.

BILLY:

G2G e-Gov applications - over past 3 years	G2G e-Gov applications - Underway, to be implemented in next 3 years	Capacity
Quarry System; Road Control System;	Business Process Management System; Project Management System; Enterprise Content Management System.	Senior user; Project lead;

MOTIVATIONS FOR G2G

IA:

What were the reasons and intended benefits for implementing G2G?

BILLY:

We are looking for systems to enable and speed up the business processes. Introducing workflows and monitoring them. Implementing business rules and making sure that the rules are catered for in the workflows. Of course the other things like reducing paper, getting rid of forms and files as we start to now pass things through the workflow and systems.

USER ADOPTION

IA:

Did **user adoption** affect G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.

BILLY:

The main challenge when you get into a new system is that people view it sceptically. Nowadays they are more sceptical because they think the system will be used to see how much work you are doing, as if someone is looking over your shoulder. People are therefore reluctant to make the system work, as it will show their shortcomings.

Let's look at the A6 as an example. You find that Pam understands and Pete Sully. Pete is doing training in the cost centres and in the regions. Even after the training, still they have no clue what to do and there is reluctance to use it. You send them an A6 and you get it back exactly the same, unchanged.

People are not interested in reporting whatsoever, there is not a thing done. It's the culture, the reporting is not important. Nobody is driving it to see that they are doing what they need to do, even the GM's do not see that it gets done.

One time I required reports on the business. I went to the 2IC, he referred me to a consultant who gave the data. I took the data to the technical manager to see if it was OK,

the technical manager changed it slightly and it just did not add up when I compared what the technical manager gave me and what the consultant gave me. This was problematic, it was not correct. Then I sent to the Head and said to him his is not correct, the Head then did the third draft but it was still not correct. So to develop the system is difficult, you already have negative reporting in the field.

I tried to put in a person to look after this and drive it, to change the culture in the field. But those posts have now disappeared. You need to have the right person in the regions, who knows the system. You cannot drive the system implementation from Head Office. You find that the posts are not filled or filled by the wrong people. We need people in the regions, but the regions have other priorities. Systems are not priorities. Buy-in needs to be driven from the GM level.

Pam usually does everything herself but we have started trying to get the users involved. But usually it's just the closest region, not all regions are involved. An example is that it was decided we will use ATE's and assist them to register, and place them in our regional offices and cost centres. We need to equip them, give them a computer, give them the design software so that they can do their design work and give them an A0 plotter. This was supposedly agreed on by the HOD, CFO and Head of Operations. Now we are implementing this and putting the stuff out in the field. We've had the software out in the field for six months and not a single person has used it, not one single person. So even though the Head of Operations knew and had agreed, there was no feedback from the Head of Operations office to the GM's and the cost centre managers. Nobody knew it was coming. In fact in the Durban Metro office they said we don't have an office for an A0 plotter and we don't need it. This is an example of where people have not been involved and issues emerge later on.

I find it strange though because when we were doing the procurement of this I had sent a letter to the cost centre managers and the regional managers and it still did not get to anyone. They don't discuss system related stuff at their meetings, or it's not a priority so the information does not get out there. The stuff is not used to date, Tim went out there and got them trained up but they still come back and say they don't know how to use it. I don't know what to say because this is the same software that they should have used at tech, so what they did at tech I don't know. Nothing boggles the mind anymore. There is not enough oversight. But also they oversee what's important to them. I mean they have

their meetings and prioritise what they need, but that's not what we need and certainly not what the system needs.

HUMAN RESOURCES

IA:

Did **human resource (HR) skills** affect G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.

BILLY:

We had a company here for our Disaster Recovery Planning. It turned out that the real disaster is that the minimum staff needed in the event of a disaster is more than the current staff complement. There are embargoes on posts, posts have been done away with at one time, and we needed to recreate posts if we wanted to fill. We have not effectively filled posts since 2007.

There are not enough people to use the systems and to be involved in the projects. We have people that have qualifications but cannot do the work.

Surveyors in Ladysmith and PMB are an example of this. They have to call out guys from HQ to assist with the work they need to do. They just don't have the right skills, they are trained but don't assimilate anything. It's easy to just call HQ when needed. There's a reliance on HQ to support the regions and cost centres, it's become a cultural issue.

In the regions - if someone resigns or leaves - in the past there used to be handover to the supervisor. The next guy that comes in was taken through the process and brought up to speed. Nowadays if someone leaves then the tasks just hang in the air and nobody is concerned about them. That info just lies in their head. When that person walks out of that office, the next guy does not have a duty list and does not know where to start. So he just makes up his own duty list, and of course he will make it up to suit himself. All compliance things are not being done whatsoever, because they don't like doing it. Major tasks, especially when you look at e-Gov, you go to the office and ask "where is so and so", and they say "Oh no he's left." There might be someone doing his job but there is no continuity, you ask "where is the stuff that he was working on" and nobody knows. There is such a turnover of staff; it's just about now impossible. Pete was doing the training, but

it was an ongoing thing. Either the person in the job still didn't know how to do it, or there was a new person in the job.

Each job should have duties and procedures, people don't know about procedures. It used to be documented over the years, but now very little is being documents except maybe some of the technical things like Road Control. This is especially true in the regions and cost centres.

Skill sets to implement G2G systems is a difficult thing to find and problematic, and then someone to take over after implementation. Finding a driver within the department is also difficult. With the GIS, you have myself and Mary, if we hadn't driven it then it would not be where it is today. Road Control there was a driver; I tried to drive it as much as I could. Now the problem is staff shortage to actually use the system. PIMS I don't think will happen in my lifetime because there is no driver.

The biggest risk is that there must be a driver within the department. You really need someone to drive it and drive it and drive it. Especially if it's a system that will be used out in the regions and at HQ.

COMPLEXITY

IA:

Did **complexity** affect G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.

BILLY:

You just cannot make the system too complex for them, look at the A6. The complexity is part of the problem why it's not used. It must be a simplified design, with a very simple front end. People don't need to see the back end. You need some that understands the back end, but this should not affect the users. There must also be enough validations on the front-end to validate the data, and limit data capture errors.

When it comes to legislation, I was involved in building up the Roads Act. But nobody is taking the time to understand the legislation nowadays. But that governs how we operate,

if we don't understand the Acts then the system implementation becomes difficult. People from the department phone me to ask for help, and you can tell they don't know the Act.

The requirements for G2G are not too complex. I mean people should be doing it in their jobs already, it should be part of their job e.g. the A6, all the payments were going into one vote and could not give you details. The requirements from one system to another differ, you need the right skill sets to analyse and guide the requirements documentation.

Integration has its challenges. When it comes to Road Control and GIS, I think its skills related. I am not sure they understand what to do. They say we've done our part of it and it's done, but it does not work — they don't fully understand the requirements for integration. It comes down to the skill sets needed, and the co-operation between two bodies.

TECHNOLOGY INFRASTRUCTURE:

IA:

Did **technology infrastructure** affect G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.

BILLY:

Well infrastructure has been a challenge for a long time. The Quarry system for instance at T², it was a problem of bandwidth which affected the system speed. The system must be built around what is in place, look at the network architecture; don't just build the system with some pie in the sky design — or sometimes no design at all.

Infrastructure in the regional offices, they do not have everything in place. They are upgrading now. The Survey unit is proactive, we run Civil Designer as an example. So we indicate what PC is required as the program advances. But the guys grab the best PCs. The administrators are issuing PCs and the guys that need it do not always get what they need. You then find the users use the system once, it hangs and then they stop using the software.

You just need to meet the users to understand what they require. Managers are not using the GIS, they are not managing using the GIS. It's not used in the regions; they just phone myself and Mary.

It's easier to make it someone else's responsibility. Phone Billy or Mary, why should I take control of the system. I wanted to put a person out there, in the past it was in the place on the structure, but the duties have since been hijacked.

OTHER CHALLENGES:

IA:

Where there **any other challenges** that affected G2G in the KwaZulu-Natal Department of Transport? Please indicate why and how.

BILLY:

We've covered most of them. But I think the time factor to implement the G2G systems is important. You find it's going on for years and years e.g. PIMS, ECM — that started 20 years ago by the way.

Also people work in silos, there is no integration within the silos. And we develop systems in silos. An example is the GIS. Road Freight and Taxi have their own GIS. They had someone, that person resigned. A new person has taken over, but GIS work is not done anymore, does not know anything about GIS to start off with.

IA:

What will be the future direction of G2G in the KwaZulu-Natal Department of Transport?

BILLY:

We are still busy with a number of different systems like the ECM and the PIMS system. So we are going to continue to focus on implementing these G2G systems. They are critical for the core functions of the Department. We need to have the information in place to make strategic decisions. We also have to make sure we are able to answer to audit queries.

RECOMMENDATIONS:

IA:

Do you have any recommendations and suggestions regarding G2G in the KwaZulu-Natal Department of Transport? (If yes, please describe).

BILLY:

The time to procure is another issue. It affects the process of getting the system up and running. Instead of just focussing on the minimum to get things going, you find we want the Rolls Royce and things just don't go anywhere. The systems end up being too big, too complex. We should start small, you find then people understand the system and the system grows and people grow with the system. Sometimes though even the basics end up being too complex, and you never get the buy-in.

ADDENDUM 6: PROFILE OF INTERVIEWEES

Table 26. Profile of interviewees

Type	Name	Gender	Organisation	G2G experience
User	Walter	Male	KZN DoT	G2G project lead, G2G end user
User	Ron	Male	KZN DoT	G2G project lead, G2G end user
User	Billy	Male	KZN DoT	G2G project lead, G2G end user
User	Joe	Male	KZN DoT	G2G project lead, G2G end user
User	Veronica	Female	KZN DoT	G2G end user
Technical	Andre	Male	SITA	ICT technical specialist
Technical	Ria	Female	SITA	G2G design and implementation
Technical	Bernice	Female	SITA	G2G analysis, design and implementation
Technical	Gerrie	Male	SITA	G2G analysis and design
Technical	Nontobeko	Female	SITA	G2G analysis
Management	Donna	Female	SITA	G2G project lead
Management	Jill	Female	KZN DoT	G2G project lead, ICT technical specialist
Management	Kasturi	Female	KZN DoT	G2G project lead
Management	Ari	Male	KZN DoT	IT technical manager
Management	Kobus	Male	SITA	G2G project manager

ADDENDUM 7: PROFILE OF GOVERNMENT-TO-GOVERNMENT SYSTEMS

Table 27. Profile of Government-to-Government systems (adapted from Position Paper on Information Technology Systems in the KwaZulu-Natal Department of Transport (KZN DoT, 2013b))

System	Key functions	Current status	G2G criteria
Road Control	<p>The system is used to capture, manage and track road control applications received for assessment and approvals in relation to provincial roads.</p> <p>Types of applications include road control (access to a main or district road, application for a development, subdivision of land or land-use change, and so on), real estate (e.g. land disposals and expropriations) and road management administration (e.g. sign posts and advertising).</p>	Implemented, in use.	<p>User base: KZN DoT departmental employees; citizens.</p> <p>System functionality: System supports intra-departmental processes related to delivery of the Department’s core services. The system also supports making the Department’s services accessible to citizens electronically, where a road control application can be submitted online.</p> <p>Cross-functional system: Yes. This system comprises a G2G component (back-office processes are supported) and also a G2C component (making the service accessible to citizens).</p>
Business Process Management	<p>A Business Process Management (BPM) solution has been implemented in the Department, and this software can be used to automate different types of business processes.</p> <p>Business process modelling is currently under way to define the process flows and rules for processes that are to be automated.</p>	Implemented, in use. Further implementation in progress.	<p>User base: KZN DoT departmental employees.</p> <p>System functionality: System supports intra-departmental processes related to support services (e.g. supply chain management) as well as intra-departmental processes related to delivery of the Department’s core services.</p> <p>Cross-functional system: N/A.</p>

System	Key functions	Current status	G2G criteria
Budgeting System	Provides functionality for budget planning (including creation of budgets, funds calculation and allocation, fund distribution and budget plan maintenance) and budget implementation (including adjusting budgets and recording co-funding details).	Analysis completed. Planning for implementation in progress.	User base: KZN DoT departmental employees. System functionality: System supports intra-departmental processes related to a support service (i.e. budgeting is a support service required to deliver the Department's core services). Cross-functional system: N/A.
Project Management System	Provides high-level project management for the complete project life cycle. It includes identification, assessment, approval, prioritisation and selection of projects. Intended to be used primarily for construction projects; however, it is designed to be configurable for any type of project in the KZN DoT.	Analysis completed. Planning for implementation in progress.	User base: KZN DoT departmental employees. System functionality: System supports intra-departmental processes related to delivery of the Department's core services. Cross-functional system: N/A.
Road Maintenance System	The system is used for planning and controlling maintenance on KZN DoT roads. Maintain and calculate costs of road maintenance projects.	Obsolete, new system required.	User base: KZN DoT departmental employees. System functionality: System supports intra-departmental processes related to delivery of the Department's core services. Cross-functional system: N/A.

System	Key functions	Current status	G2G criteria
Road Asset Management System	<p>The core road network information system for the Department; records information about the KZN DoT Roads Asset base.</p> <p>System is structured to include core data (e.g. road numbers, locations, kilometres and categories), inventory data (e.g. signs, arrestor beds, traffic signals and ramps) and data about features on roads. The system includes inspection data (e.g. visual pavement inspection, road testing and evaluation and illegal access identification).</p>	Obsolete, new system required.	<p>User base: KZN DoT departmental employees.</p> <p>System functionality: System supports intra-departmental processes related to delivery of the Department's core services.</p> <p>Cross-functional system: N/A.</p>
Accident Management System	<p>Record and maintain accident statistics as required by legislation.</p> <p>Traffic Engineering also uses the data to identify fatalities, assess the roads and trigger road safety improvements where needed.</p>	Existing system in use; however, new solutions are under investigation at present.	<p>User base: KZN DoT departmental employees.</p> <p>System functionality: System supports intra-departmental processes related to delivery of the Department's core services.</p> <p>Cross-functional system: N/A.</p>
Traffic Counts System	<p>This system is used to record data about traffic flow on departmental roads.</p> <p>Automated or manual counts are done and data is captured in the system.</p>	<p>Existing system in use.</p> <p>Data sourcing is outsourced and uploaded onto the system.</p>	<p>User base: KZN DoT departmental employees.</p> <p>System functionality: System supports intra-departmental processes related to delivery of the Department's core services.</p> <p>Cross-functional system: N/A.</p>

System	Key functions	Current status	G2G criteria
Quarry System	<p>Used to manage the road material sources for the KZN DoT; used in construction and maintenance of roads.</p> <p>Manages information about applications to open/re-enter or extend the road material source, workflow processes for approval of applications and tracking of expropriations by Real Estate business unit.</p>	Obsolete, new system required.	<p>User base: KZN DoT departmental employees.</p> <p>System functionality: System supports intra-departmental processes related to delivery of the Department's core services.</p> <p>Cross-functional system: N/A.</p>
Enterprise Content Management System	<p>This system is used to manage different types of electronic documents and records. This includes, for example, submissions, memos, HR records, maps and plans. It also includes workflow functionality to review and approve documents.</p> <p>Document versions can be tracked and managed.</p>	Implementation in progress.	<p>User base: KZN DoT departmental employees.</p> <p>System functionality: System supports intra-departmental processes related to delivery of the Department's core services and support services.</p> <p>Cross-functional system: N/A.</p>

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ETHICAL CLEARANCE



21 October 2013

Mr Mohamed I Abdulla (202515420)
School of Management, IT & Governance
Pietermaritzburg Campus

Protocol reference number: HSS/1113/013M
Project title: Challenges of Government-to-Government e-Government: A case study of KwaZulu-Natal Department of Transport

Dear Mr Abdulla,

Expedited Approval

I wish to inform you that your application has been granted Full Approval.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully


.....
Dr Shenuka Singh (Acting Chair)

/ms

cc Supervisor: Professor Brian McArthur
cc Academic Leader Research: Professor Brian McArthur
cc School Administrator: Ms Debbie Cunyngame

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