Government-to-Government e-Government: A Case Study of Challenges Facing User Adoption in KwaZulu-Natal[1]

I. Abdulla
B.W. McArthur

Abstract

e-Government (e-Gov) projects are continuing to fail in countries across the world, including South Africa. Therefore, although e-Gov presents a means to transform government service delivery to citizens, the intended benefits are not achieved. In addition, the failure of e-Gov leads to significant wasteful expenditure. This paper focuses on a specific category of e-Gov, Government-to-Government (G2G), concerned with the use of Information and Communications Technology to automate and streamline business processes within a government department and across departments. Challenges facing user adoption of G2G in a South African context are analysed using the KwaZulu-Natal Department of Transport as a case study. As the first step in this research, cases of G2G user adoption challenges in South African government were identified. This helped inform the focus of the literature review and the research instrument used. A qualitative research methodology was used to understand the G2G user adoption challenges. This research has shown that user adoption is a central challenge facing G2G. 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*. Technology infra-

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structure was identified as an important yet peripheral issue affecting G2G. This research has provided a deeper understanding of the challenges facing G2G user adoption, by focusing on these emerging themes and sub-themes and describing how they impact on G2G. The findings are summarised in a G2G User Adoption Challenges model.

Keywords: e-Government, Government-to-Government, User adoption, G2G challenges.

Introduction

Although there is no universally accepted definition of e-Government (e-Gov) (Halchin 2004; Yildiz 2007; Abrahams 2009), one view of e-Gov is the provision and enhancement of government services, internal processes and service delivery through the use of technology (Maumbe *et al*. 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 & Brudney 2001; Ndou 2004; Presidential National Commission (PNC) 2012; Department of Communications (DoC) 2013).

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 & Irani 2005; DoC 2013) and the National Automated Archival Retrieval System (NAAIRS), which is used by government for automated access to archived government records (Cloete 2012; DoC 2013).

There are a number of motivators for implementing e-Gov. One such motivator 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 2011; DoC 2013).

The South African government also recognises these motivators for e-Gov and the fact that e-Gov can play a role in transforming service delivery to

citizens (Department of Public Service and Administration (DPSA) 2001; DPSA 2008; DoC 2013). Accordingly, R1.7 billion was allocated by the South African government to be spent on ICT over three fiscal years through 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 on 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 implementtation of e-Gov faces certain challenges.

This article attempts to better understand e-Gov challenges in South Africa with specific focus on user adoption challenges facing G2G. G2G was selected in particular as it is believed that 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.

For instance, online booking for a driver's license test (G2C) will be of limited value if the application form is completed by the applicant online whilst the back-end processes executed thereafter by the department staff to process the application, conduct the test and issue the license are not automated or supported by technology (G2G).

In addition, e-Gov and G2G success is particularly important at present, as a number of Government 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 chances of successful implementation of G2G. Accordingly, such research can be useful in developing more robust and effective plans in anticipation of what often goes wrong in e-Gov projects (Dada 2006).

The remainder of the article is structured as follows: Section 2 states the problem followed by Section 3 which presents a review of the literature on G2G user adoption challenges, including the current state of e-Gov in South Africa and cases of G2G challenges in South Africa; Section 4 describes the methodology used in this research; Section 5 provides an overview of the case being the KZN Department of Transport; Section 6 presents data analysis and research findings; finally, Section 7 discusses recommendations and limitations.

Problem Statement

Although it is acknowledged that G2G can improve government service delivery and significant financial resources have been allocated to its implementation, G2G suffers from a high failure rate. G2G therefore faces challenges, which include lack of user adoption, preventing the full benefits from being realised. The research questions are therefore:

1. How does user adoption affect G2G?
2. What are the other challenges affecting G2G?

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). The specific research objectives were:

1. To determine whether user adoption presents challenges to G2G in KwaZulu-Natal; and
2. To better understand user adoption challenges of G2G, should such challenges exist.

Literature Review

The literature review comprises four parts (1) An overview of the state of e-Gov in South Africa; (2) presentation of selected cases in South Africa where G2G challenges were identified; (3) review of literature on G2G user adoption; and (4) conclusions.

State 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; Abrahams 2009; Cloete 2012). Various national and provincial government departments, state-owned and public entities in South Africa have undertaken e-Gov initiatives that also highlight

some progress in implementation of e-Gov (Moodley 2005; Naidoo 2007; PNC 2012; Cloete 2012; DoC 2013).

Other approaches used in the literature to assess the state of e-Gov in South Africa include the following:

1. An investigation into whether e-Gov investments in South Africa are paying off against the expected benefits. 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 on e-Gov projects. South African participants in the study also acknowledged that planned e-Gov benefits were not always realised (Naidoo & Palk 2010).

2. A qualitative study into the challenges of e-Gov in South Africa focused on the Western Cape provincial government. Leadership, project fragmentation, perceived value of ICT, citizen inclusion and co-ordination of tasks were identified as some of the key challenges inhibiting e-Gov success in the Western Cape provincial government (Matavire *et al*. 2010).

3. Rorissa *et al*. (2011) provide five alternative e-Gov benchmarking frameworks. According to their preferred benchmarking framework, South Africa ranks third in Africa in the e-Gov benchmarking index. Egypt and Tunisia are ranked first and second respectively.

e-Gov is therefore a priority for South African government and some progress has been made in the implementation of e-Gov. Challenges have however been identified in South Africa as well.

Cases of G2G Challenges in South Africa

There is a lack of published research into the current state of G2G and G2G challenges in South Africa. Thus the following limited set of cases was identified as a reference for G2G challenges in the country. These cases served to (1) create initial context and understanding of the G2G challenges; (2) inform the focus of the literature review; and (3) limit the scope of the research by specifically seeking to understand G2G challenges which were illustrated in the cases.

Integrated Financial Management System (IFMS)

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 and Public Service Act.

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).

The following challenges were identified in this project (PMG 2012):

1. Complexity of the IFMS program;
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; and
6. Lack of functional skills and capacity in some departments.

Durban Council's Community Information Link (CIL)

This project was initiated by the Durban Metro Council using an existing library network to provide web-based community and council information. The system was intended to provide a database of small for-profit businesses in the community.

It also allowed for 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 $175 000 (Heeks 2008).

Heeks (2008) describes the following challenges encountered on this project:

1. There was little use of CIL as content was only in English and not in any other language;

2. The information from the council was not kept up-to-date;
3. Lack of HR capacity due to insufficient library staff; and
4. Lack of support and ownership from the highest levels in the library system, as well as a lack of support from within the Council.

eNaTIS

The National 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 findings that were still to be addressed or partially resolved (AGSA 2008). These included:

1. Project costs significantly exceeding the tender amount;
2. Inadequate infrastructure resulting in poor system performance;
3. System and user manuals and procedures still required and enhanced support required at provincial level;
4. Security issues related to user access and segregation of duties, physical access control at eNaTIS data centre, disaster recovery site and backups not tested, logical access controls as well as database and operating system security;
5. Unresolved data errors that were transferred to the new system and lack of data migration documentation; and
6. Scope changes resulting in significant overruns in terms of cost and implementation date were also noted (AGSA 2008).

HR Management System – Personnel Salary System (PERSAL)

The Presidency (2010) highlighted challenges in the Personnel Salary system (PERSAL) which is used across all National and Provincial government departments in South Africa:

1. Functionality was deemed to be lacking in the PERSAL system,

negatively impacting on the public service ability to plan strategically around human resources;
2. Data quality is highlighted with data clean-up projects planned;
3. The enhancement of skills and capacity was highlighted through training on system functionality and awareness campaigns on the system; and
4. Change management strategy was identified to create awareness of the project, its benefits and improve management and use of the Personnel Salary System (PERSAL).

The four G2G cases discussed above indicate that G2G faces challenges in South Africa. User adoption has also been identified as a challenge facing G2G, together with several other related challenges.

G2G User Adoption Challenges: Reviewing the Literature

In order for ICT to improve the productivity of organisations, it must be accepted and used by the employees of the organisation (Venkatesh *et al*. 2003). This applies to G2G as well with the success of G2G dependant on appropriate use of the system by the intended user base i.e. user adoption.

Failure to adopt the system may mean that the expected benefits of G2G cannot be realised (Koh *et al*. 2010). Lack of G2G user adoption is however complex and can be caused by different reasons; some of these reasons are discussed below.

Lack of User Involvement

Lack of user involvement is one reason that may hinder 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. Thus, inadequate user involvement in G2G projects may result in user resistance or system abandonment.

Abrahams (2009) highlights the need for e-Gov to focus on the challenges facing citizens and other governmental stakeholders. Thus, e-Gov should be concerned with making government services readily available and accessible with a quicker turnaround time. In order to achieve this outcome, citizens must be involved in e-Gov implementation strategies whilst also developing mechanisms to evaluate and monitor service delivery enabled by e-Gov (Mututla 2012).

Inadequate Change Management

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 (Mutula 2012). Incentives to create ownership and commitment are also required (Hossan *et al*. 2006), whilst governments must commit to genuine transformation focused on more transparent and citizen-centred government (Mutula 2012).

Readiness and change management have also been identified as a challenge 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 (Heeks 2008). It would therefore seem as if change management requires different forms of interventions to ensure user adoption.

Organisational Culture Barriers

Organisational culture may also prove to be a barrier to user adoption of e-Gov (Ndou 2004; Ebrahim & Irani 2005). In this case, lack of adoption by users may be pre-meditated. 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).

Within a South African context, there is a need to consider the various diverse governmental departments and other entities that have a role to play in e-Gov, which in turn may impact on a specific department's e-Gov initiatives (Abrahams 2009). In addition, any e-Gov initiative must be tailored to a local context, considering language, culture, content and accessibility (Mutula 2012). Thus, when a specific government department undertakes an e-Gov initiative due consideration must be given to the holistic context of e-Gov in South Africa whilst simultaneously considering the tailoring required to fit into that department's context. There is therefore a need to identify, understand and address potential organisational cultural barriers.

Addressing User Needs

Users' needs must be addressed in order to achieve user adoption. These needs aredefined 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). 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). Therefore, difficulty in eliciting and accurately documenting user requirements contributes towards lack of user adoption.

Conclusion of Literature Review

G2G faces user adoption challenges in South Africa as illustrated with the examples of cases identified. The literature has confirmed the importance of

user adoption for any system to realize intended benefits. In addition, the literature has highlighted some of the G2G user adoption challenges as: the lack of user involvement, inadequate change management, organizational culture barriers and the failure to address user needs.

Research Methodology

The research question aimed to understand how the identified challenges (identified based on G2G cases in South Africa and confirmed by the literature review) affect user adoption of G2G. A qualitative research methodology was used in this study with a case-study research design. One reason for choosing a qualitative research methodology was a response to the dominance of quantitative research in e-Gov (Heeks & Bailur 2007). In research conducted by Irani *et al*. (2012), e-Gov academic journal articles published between 2000 and 2012 were analysed and only 7% were found to be qualitative.

The research sites were the KwaZulu-Natal Department of Transport (KZN DoT) and the KZN State Information Technology Agency (SITA), which is the ICT arm of the South African Government and provides ICT services to the KZN DoT.

The boundaries of the case-study were defined by:

(1) Systems must meet the definition of G2G which was established upfront;
(2) G2G site and timeframe: G2G systems which were implemented or implementation in progress at KZN DoT were considered within a defined five year timeframe; and
(3) G2G Challenges: the research focused on G2G challenges with a definition of a *challenge* established upfront.

In addition, specific challenges were identified by the cases of G2G in South Africa and the literature review; these specific challenges formed a further boundary around the case.

Data on G2G challenges in KZN DoT were gathered through semi-structured, in-depth interviews and document analysis. Firstly, an open-ended question about the interviewee's experiences with G2G user adoption challenges was asked, followed by further specific probing questions based on

G2G user adoption challenges identified in the literature and in the cases of G2G user adoption identified in South Africa.

Fifteen research participants were interviewed from the KZN DoT (8 interviewees) and KZN SITA (7 interviewees). Purposive sampling was applied as interviewees who had prior experience with planning, design, development and implementation of G2G in KZN DoT were included in the study. The profile of interviewees included G2G users, management and technical staff. Purposive sampling was also applied to documents related to or referencing G2G in the KZN DoT, and included Request for Proposal (RFP) documents and KZN DoT G2G project related documents.

Thematic analysis was applied in conjunction with qualitative coding to analyse field data. These processes can be described as first- and second-cycle coding, where the first cycle of coding is an initial way of condensing and summarising data identifying prompts or triggers for deeper reflection on the meaning of the data (Creswell 2007; Miles *et al*. 2014). Thus, more general ideas, instances, themes or categories can emerge from within the data (Lewins & Silver 2010). NVivo 10 was used as the Computer Aided Qualitative Data Analysis Software (CAQDAS).

This data analysis approach has provided deeper, contextual understanding of the challenges facing G2G within the established boundaries of this case study.

This research aimed to elaborate on existing research. Although the literature has identified several e-Gov challenges, there are gaps in terms of the G2G specific challenges in a South African context. There are also gaps in terms of user adoption challenges, in particular.

The Case: KwaZulu-Natal Department of Transport

This research is a descriptive case study on the KwaZulu-Natal (KZN) Department of Transport (DoT), a provincial government department in the KZN province in South Africa.

The KZN DoT's core functions include transport infrastructure services (concerned mainly with road construction and maintenance) and transport service provision (concerned mainly with road safety, the road traffic inspectorate, vehicle and license registration, 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).

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 the KZN province from a roads and traffic management point of view (KZN DoT, 2011).

Research Findings

Results

For the purposes of this study, user adoption refers to the end-user in the department transacting on a G2G system to execute a business process. The field data has confirmed that user adoption is an important challenge facing G2G. As one interviewee puts it, 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* - pseudonym used).*

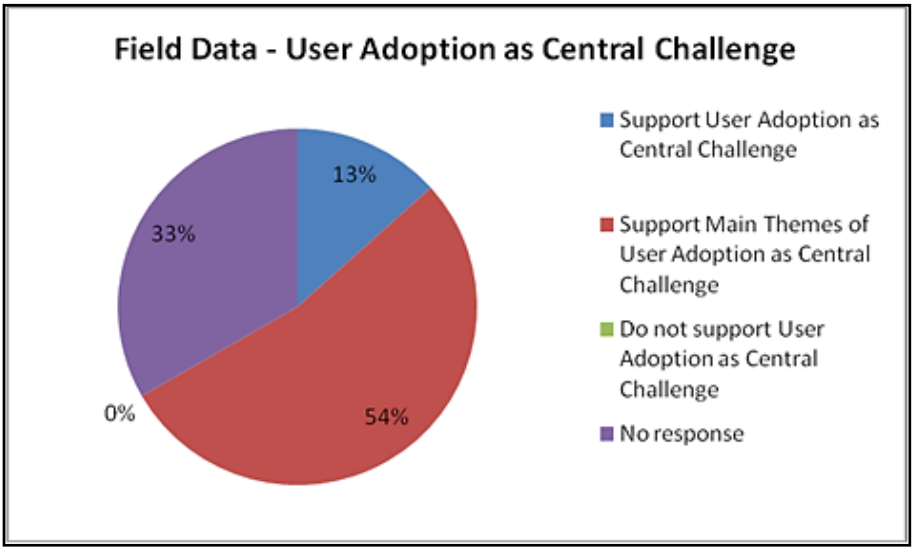

Figure 1: Field data evidence supporting user adoption as the central challenge of Government-to-Government

The field data has also identified six main user adoption themes, eight user adoption sub-themes and various relationships between user adoption, the main themes and the sub-themes. These main themes, sub-themes and relationships have provided insight into G2G user adoption. An overview of the data is shown below, and the subsequent sections discuss the main themes and sub-themes in detail.

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 1 above.

This graph is based on actual evidence from the field data, as illustrated in the sample quote 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.

Figure 2 (overleaf) shows the percentage of field data evidence per interviewee in relation to the total data yielded for each of the main themes, thus supporting the six main themes as challenges related to G2G user adoption.

Main Themes of G2G User Adoption

The field data has also expanded the understanding of the concept of G2G user adoption; six main themes related to G2G user adoption were identified and described: *Addressing User Requirements*, *Business Process Management*, *Change Management*, *User Involvement*, *Priority* and *Organisational Culture*. These main themes, with the exception of *Priority*, were also evident in the literature review. The findings for the main themes are discussed below together with an illustrative example from the field data:

1. **Addressing User Requirements:** The G2G system must ensure that the most important business needs of users are addressed. Not addressing user needs reduces the likelihood that the system will be adopted by users.

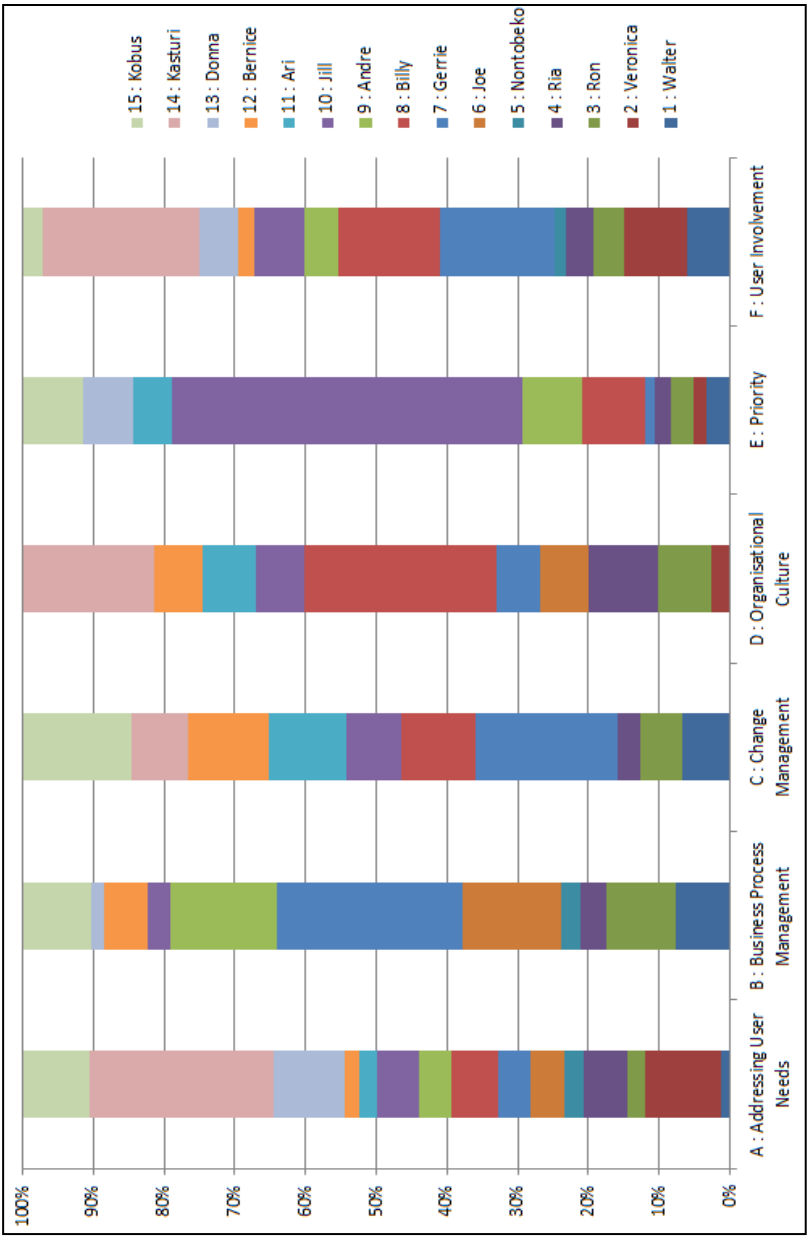

Figure 2: Field data per interviewee as a percentage of total data yielded for the theme

This can however be difficult to achieve as requirements cannot be easily prioritised *'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' (Billy*).*

2. **Business Process Management:** When a G2G system is implemented, business processes must be adapted for changes which the system may impose. Conversely, if business processes are not intended to change then the system must be adapted to business processes.Walter* explains one reason why G2G is abandoned by users *'Maybe this is because the business processes are able to run without the system, so it is just bypassed. The systems should be a central part of the process, there should not be a way to get around the process without using the system. I think that once you have these workarounds, people tend to bypass the systems and eventually stop using it'.*

3. **Change Management:** Users must be aware of the implementation of G2G systems and their buy-in must be obtained. Communication to users throughout the G2G project is a form of effective change management. Effective change management was seen as a pre-requisite for user adoption and it should not be done only at 'face value' level. Ron* indicates the importance of change management in user adoption *'I think change management is the most important component of user adoption. You have to make the departmental staff aware of what's coming down the line, and more importantly how it will affect them. You cannot just say that from today onwards forget how you did things over the last 10 years, just start using the system now'.*

4. **User Involvement:** Users must be part of the process of designing and implementing G2G. This increases likelihood of user adoption. According to Walter* *'Users must be involved throughout the whole process. They need to be given the opportunity to provide their inputs and requirements, as they are the ones who will eventually use the*

system. I mean you do not send someone else out to buy a car that you will drive'.

5. **Priority:** G2G systems must be given priority in the business environment. This includes prioritising project related tasks over business tasks to ensure that the project meets its deadlines and objectives. It also includes prioritising use of the system so that users do not attempt to bypass the system in the daily tasks. Conflicting priorities can also impact on G2G user adoption as explained by Andre* *'Getting cooperation 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'.*

6. **Organisational Culture:** The culture of the organization must be open to the use of technology and the changes which will be introduced by G2G systems. Organisational culture barriers (such as not wanting to create transparency on business functions and performance) may pose challenges to G2G user adoption. Culture can also negatively impact G2G user adoption as indicated by Ron* *'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'.*

Sub-Themes of G2G User Adoption

The challenges of G2G user adoption are not straight-forward but multi-dimensional and complex in nature. The field data has also shown that within the six user adoption main themes, there are a number of sub-themes which serve to further explain the G2G challenges in the KZN DoT. 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 sub-themes identified include Strategy, Usability, Complexity, Resistance, Systems development methodologies, Management support, HR

skills and Data quality. Using the field data, these sub-themes can be defined as follows:

1. **Strategy:** A long-term vision and high level plan to achieve business goals.

2. **Usability:** The ease of use of a system and the extent to which it meets user needs.

3. **Complexity:** This includes human, business and technical factors.

4. **Resistance**: Users deliberately refusing to make use of a G2G system or deliberately making the implementation of G2G difficult. This includes lack of support and involvement required from users.

5. **Systems development methodologies:** A structured approach to prioritising, designing, developing, implementing and supporting G2G systems. In this study. The methodology extends before and beyond the traditional systems development lifecycle (SDLC).

6. **Management support:** Buy-in, involvement and belief in the value of G2G from senior executives in the department.

7. **HR skills:** Adequate number of human resources and the expertise of the resources.

8. **Data quality:** The accuracy, reliability and validity of data that is used to make business decisions.

Table 1 provides an overview of how each of these sub-themes affects G2G user adoption and presents challenges to G2G.

Table 1. Impact of sub-themes on G2G user adoption

Sub Theme	Impact on G2G User Adoption
Complexity	Complexity exists in analysing and documenting user requirements, as well as dealing with varying business processes across the environment. Lack of knowledge management, outsourcing of G2G, outdated technologies and incompatible technologies also introduce complexity.
System development methodologies	Systems development methodologies must be in place. The methodology must ensure that appropriate G2G design and architecture is defined, appropriate users are identified, change management is planned for and implemented, business process changes are addressed, and that system documentation is produced. Changing user requirements must be managed by the methodology. The methodology should also ensure that provision is made for the support of G2G post-implementation, considering that staff may turnover.
Resistance	The culture of the organisation may affect G2G, especially where decisions are made at top level without user involvement. Effective user involvement may reduce resistance; however mechanisms must be in place to address competing or contradictory views and requirements from users. Lack of buy-in from users results in resistance, whereby users do not contribute to defining the requirements of G2G

Sub Theme	Impact on G2G User Adoption
Skills	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 business process re-engineering, articulating and documenting user requirements, implementing change management, and making system changes to G2G effectively. The reliance on consultants, changes in resources and heavy reliance on specific individuals poses challenges to G2G. Appropriate training must be provided for G2G throughout the lifecycle of G2G, and not only at implementation.
Strategy	An overall strategy for the implementation of G2G is required. The strategy must provide a roadmap for each of the e-Gov systems in the landscape. Strategy should also address how HR skills will be provided, how cut-over to new systems will be addressed, and how technical infrastructure requirements are to be met.
Management Support	Management must serve as a driver of G2G, ensuring that there is awareness of the value of G2G, and to enforce the cut-over from manual processes or existing systems to G2G. They need to be involved in G2G personally, provide direction for G2G and ensure that change management is effectively implemented. 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.

Sub Theme	Impact on G2G User Adoption
Data Quality	High quality data can improve users' confidence in G2G, whilst user involvement in G2G can assist with improving data quality during implementation of G2G. 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.
Usability	User friendly designs must be considered to increase likelihood of user adoption.

Technology Infrastructure

Appropriate technological infrastructure, such as networks, servers, routers and Internet connections are important for e-Gov success (Ebrahim & Irani 2005; Gil-Garcia & Pardo 2005). Research also 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).

In this study, technology infrastructure in itself was not seen by interviewees as an important challenge. This means that whilst interviewees believed technology infrastructure does affect G2G, there was a clear understanding of the issues around technology infrastructure, and what solutions are required to address them. The known technology infrastructure issues which emerged were (1) the lack of availability of infrastructure such as PCs and servers; and (2) inadequate bandwidth which affects the performance of G2G systems.

However, interviewees believed at the same time that there are issues underlying technology infrastructure that are problematic. In particular, it emerged that technology infrastructure is related to the sub-themes described in the previous section; these relationships are summarised in Table 2.

Table 2. Impact of Technology Infrastructure on Sub-Themes

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.

Emerging Model on G2G User Adoption Challenges

This research has shown that user adoption is a 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 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 did not emerge as an important challenge facing G2G 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 not seen as 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.

These research findings can be summarised in a model of the challenges of G2G in the KZN DoT as shown in Figure 3. This model highlights an 'onion-like' structure to the challenges. The model is '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 are addressed.

Whilst Technology Infrastructure exists as a peripheral challenge, it has to be considered and incorporated into addressing the sub-themes. Thus, addressing sub-themes would likely automatically address the Technology Infrastructure challenges.Although the model primarily provides a means of under-standing G2G challenges, the structure that has emerged in the model may also provide a structure for addressing G2G challenges and planning G2G projects.

Conclusion and Recommendations

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 link to soft issues points toward 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.

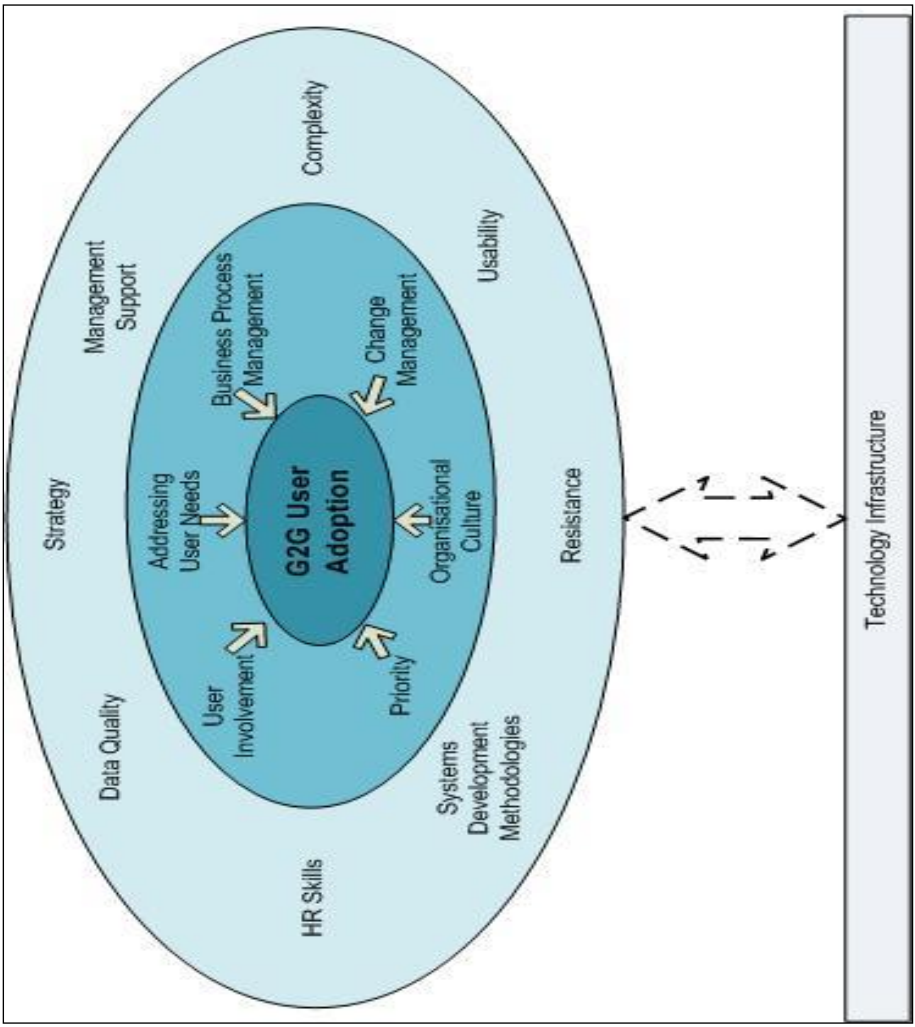

Figure 3. Final model – Challenges of Government-to-Government in the KwaZulu-Natal Department of Transport.

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 a need for a change in thinking and a change in approach to G2G, addressing 'softer issues' first and then focusing on 'technical issues'.

One recommendation from this research is to further unpack the new challenges that have emerged, to unpack the relationships and dependencies between the challenges, as well as to unpack some of the challenges that are less established in the literature. These challenges may be tested through a quantitative study.

An interpretive analysis can 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. This will assist in establishing a holistic view of the challenges as seen from the perspective of different, yet equally important, G2G stakeholders.

This research is based on a case-study design with the site being the KZN DoT. Thus, one limitation is that the findings may not necessarily be applicable to other government departments in South Africa. This research has, however, attempted to provide sufficiently thick description to explain research findings so that readers may judge for themselves whether the findings may be applied to their circumstances.

The research focused specifically on G2G. One of the reasons for this is due to the lack of prior research focusing on G2G. Another reason is the researcher's view that G2G is foundational for other forms of e-Gov to be successful. Thus, another limitation is that the findings from this research may not necessarily be applied to other forms of e-Gov such as G2C and G2B. However, again the thick description of findings may be used by readers to judge transferability for themselves.

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.

Future Research

The G2G challenges model 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 can 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 may be developed to address the challenges. Using the checklists or criteria for each challenge, possible approaches to resolve the challenge may be suggested.

Finally, comparative studies could be undertaken in other government departments so as to deepen the research findings.

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Irshad Abdulla
Senior Manager
KPMG Vancouver
Canada
abdulla.irshad@gmail.com

B.W. McArthur
School of Management, IT and Governance
University of KwaZulu-Natal
South Africa
mcarthurb@ukzn.ac.za