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POTENTIAL TO MITIGATE E-GOVERNMENT BARRIERS: USE OF AN IT CONTROL FRAMEWORK

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Normative models predicted broad benefits from e-government for nations, regions and citizens. However numerous e-government implementations stalled at an early phase of maturity, without achieving the advantages vaunted by governments. Subsequently, researchers accounted for the non-achievement of the more sophisticated e-government goals by identifying a range of barriers to effective e-government. While e-government requires the engagement of ICT but impacts far beyond technology, effective use of ICT necessitates in turn careful governance of the alignment between ICT and a government's business goals. This paper reports on an analysis of the theoretical capacity of IT governance to mitigate the barriers to achieving e-government, by combining knowledge from two different fields. In a data driven thematic analysis of the barriers to e-government, the study found that the majority were political and organisational in nature, while technical barriers were noted less frequently. The study mapped the barriers to achieving e-government against a well known IT governance framework, COBIT, to investigate its potential for improving e-government. A large majority of the barriers could be matched to detailed control objectives from COBIT, suggesting that COBIT may offer mitigation strategies for those barriers. The remaining barriers were outside the scope of COBIT. A contribution of this study is that the results identify for future empirical testing a range of potential mechanisms to redress e-government barriers, by implementing explicit IT governance strategies through COBIT. The results also suggest that there is scope to apply IT governance to a regional or even national government setting, while traditionally the unit of analysis in the field has been at the level of the corporation or public sector organisation.

Keywords: E-government, IT governance, COBIT, barriers.

1 INTRODUCTION

Grant and Chau (2005) developed the following definition of e-government after reviewing numerous previous studies in the area:

> *A broad-based transformation initiative, enabled by leveraging the capabilities of information and communication technology; (1) to develop and deliver high quality, seamless, and integrated public services; (2) to enable effective constituent relationship management; and (3) to support the economic and social development of goals of citizens, business, and civil society at local, state, national, and international levels (p. 9).*

This definition acknowledges the complexity of e-government as well as the enabling role of Information and Communication Technology (ICT). The definition implies that e-government is a comprehensive approach to business rather than a collection of information systems.

After undertaking empirical studies, researchers noted a gap between the achievements from e-government in jurisdictions around the world and those predicted from the models of its development. Many of the e-government implementations stalled at the first or second of the four stages commonly envisioned for e-government, when the phases proposed by Chen (2002) are considered. That is, while many examples of e-government implementations that function at the first (information enabling) and second (two-way exchange) stages were observed, fewer exist that progressed to the third (transactional) or fourth (transforming) stages. Consequently, researchers identified numerous barriers to explain why most implementations do not reach the later stages of e-government. These barriers were categorised in a range of ways, including as financial, legal, organisational, technological, or political in nature (Coursey and Norris, 2008).

Researchers and practitioners have given increasing attention to improving the Information Technology (IT) governance of organisations, particularly since the establishment of a positive link between IT governance and organisational performance. One method advocated to improve IT governance is through use of an IT control framework. The best known IT control framework is *The Control Objectives for Information and Related Technology* (COBIT).

E-government researchers have been trained in a diverse range of disciplines, for example, computer science, management and government (Hu, Pan, Lu and Wang, 2009) while IT governance is a more focused field. This difference in the two fields may contribute to a limited interaction between e-government and IT governance researchers. The difference may help explain why although IT governance is a well accepted concept for large and small organisations, it appears to have been little considered at an explicit level for e-government.

The study reported upon in this paper combined knowledge from the two different fields, e-government and IT governance. It aimed to evaluate the theoretical potential of IT governance to mitigate the barriers to achieving e-government by mapping the latter against COBIT. This research will have value to help guide future researchers in their selection of empirical interventions to investigate, with the aim to overcome the barriers to e-government.

2 BACKGROUND

2.1 E-government models

The field of e-government dates from around 1996 (Coursey and Norris, 2008), while empirical research papers on e-government first appeared in 1999 (Norris and Lloyd, 2006). Official e-government websites for the delivery of information and services first appeared from around 1995

(Coursey and Norris, 2008). Researchers have proposed a range of models for e-government development since those times.

Some e-government authors used Chadwick and May's (2003) framework of the interaction between government and its citizens, which draws upon the managerial (informational), consultative (interactive), and participatory (multidirectional and democratic) models. Grant and Chau (2005) reviewed 22 operational definitions of e-government from the academic and practitioner literature published between 1992 and 2004, including that of Chadwick and May. They concluded that e-government development includes the following characteristics: enables service and information delivery; is transformational; is diverse in its solutions and applications; is international; has a strong association with IT which facilitates interactivity and involves integration; and provides a "seamless service delivery and transaction environment" (p.8) in a sophisticated manner which may involve adopting a citizen-centric perspective, service personalisation and constituent relationship management.

Coursey and Norris (2008) reviewed publications dating from 2000 and 2001 that proposed models of e-government development, including one that was considered in Grant and Chau's (2005) review. Despite noting some differences in the models, Coursey and Norris (2008) reported that all five first involved establishment of a web presence with information dissemination, before moving on to offer interactivity with citizens, transactions and then integration of government. Finally the models portrayed e-government as reaching "the seamless delivery of governmental information and services, e-participation, e-democracy, governmental transformation or some combination of the above" (p. 252).

Despite some differences, the review of models discussed above shows some commonalities in the conceptualisations of e-government development. The models place emphasis on progressive, linear development through a series of broadly common and increasingly complex phases. However, apart from the first one or two phases which model developers could observe, it was necessary for e-government models to be largely normative. E-government models were based on prediction and speculation (Coursey and Norris, 2008), or "rhetorical intention" (Davison, Wagner et al., 2005), rather than being grounded in empiricism.

As empirical studies of e-government implementations emerged a number reported a gap between the predictions of e-government's development from its models, and the achievements of e-government implementations, prompting debate on the reasons for the inconsistency. For example, Pina, Torres and Royo (2009) reported that despite improvement, few local government websites from the European Union showed "clear signs of a real openness to encourage citizen dialogue" (p. 1162). As a second example in an African setting, e-government implementations focused on government-to-government services and one-way information dissemination from government (Kaaya, 2009). Implementations of e-government did not reflect the predictions made in normative models (Coursey and Norris, 2008). Some discussion became pessimistic, referring to an inadequacy of e-government models to overcome problems in the field's development (see for example, O'Toole, 2007). Researchers recognised that the barriers to attaining the sophisticated later phases of e-government with higher level functions will be difficult to overcome (March and McNiven, 2003). Such discussion lamented a loss of opportunity to bring about positive change for citizens and nations in the ways depicted in e-government theory to date. One explanation for e-government not developing as predicted by the models is that little of the research in the area drew upon prior research into the adoption of IT in government or provided advice on how to overcome the barriers to achieving the integration of government services and information (Coursey and Norris, 2008).

2.2 Barriers to E-government

The identified barriers to effective e-government are diverse, and as expected, include issues that go far beyond the technological. An extensive electronic search of the literature was undertaken for

studies that classified the barriers to e-government, using variations on ”e-government”, as well as ”barriers”, as search terms. Five studies were identified that classified the barriers to e-government: Ebrahim and Iran (2005), Weerakody and Choudrie (2005), Coursey and Norris (2008), Sanika**s** and Weerakkody (2007), and Lam (2005).

Lam (2005) developed a taxonomy of barriers to e-government integration (EGI) and e-government projects, based on 14 interviews with experienced consultants to the public sector from major consultancy firms based in Singapore, Australia, Hong Kong, and New Zealand. As EGI assists in the seamless provision of government services to users, Lam claimed that it leads to a mature level of e-government. Ebrahim and Irani (2005) derived their classification of e-government barriers from an analysis of 20 prior studies conducted between 1994 and 2003. The Weerakkody and Choudrie (2005) study classified barriers to e-government from the perspectives of citizens and government. The last authors drew upon the results of 13 prior studies conducted between 1999 and 2003. Weerakkody and Choudrie (2005) did not identify two of the 13 studies. The methods used in the 13 studies were surveys, interviews or both. The citizen’s perspective included access, lack of awareness, security, trust, and usability. The government’s perspective included financial, skills and technology, political and legal issues, and resistance to change. The Coursey and Norris (2008) classification of barriers to e-government was derived from three national US surveys of local government conducted in 2000 and 2002. The Sarikas and Weerakkody (2007) classification was based on twelve prior studies published between 1999 and 2003 inclusive.

In four of the five classification schemes of e-government barriers referred above, researchers had developed the schemes from the results of numerous previous studies conducted over a similar period. While the researchers used some of the same studies when developing their classification schemes there were 36 unique studies of e-government barriers. Two studies referred to but not identified in Weerakkody and Choudrie (2005) were disregarded, along with another in Weerakkody and Choudrie (2005), which did not appear in the references and was similar in name and conducted in the same year as another study referenced by Sarikas and Weerakkody (2007). The 36 unique studies from the classification schemes set out in the five studies appear in Table 1.

Bhattacherjee 2002	Heeks 2001	McClure 2000
Bonham, Seifert & Thorson 2003	Ho 2002	Navarra & Cornford 2003
Bonham, Seifert & Thorson 2001	International City/County Management Association (ICMA) & Public Technology Incorporated (apparently unpublished; cited in Coursey & Norris 2008)	Moon 2002
Burn & Robins 2003	Irani, Themistocleous & Love 2003	NECCC 2000
Darrell 2002	Jarvenpaa, Tractinsky & Saarinen 1999	Norris & Moon 2005
Dillon & Pelgrin 2002	Joshi & Ghafoor 2001	Palvia, Means & Jackson. 1994
Fang 2002	Lam 2005	Porter 2004
Federal Computer Weekly 2001	Layne & Lee 2001	Reffat 2003
Fletcher & Wright 1995	Lambrinoudakis & Gritzalis 2003	Robins 2001
Gefen & Pavlou 2002	Lenk & Traunmuller 2000	Sampson 2002
Harris & Schwartz 2000	Li & Steveson 2002	Themistocleous & Irani 2001

Table 1. Identified unique studies on barriers to e-government.

The boundaries of many modern organisations are less clear than in the past. Large multinational chains approximate the complexities faced by governments. One way for organisations to address increasing complexity is through IT governance. As some of the world’s biggest corporations exceed the number of employees and the financial resources of some governments, IT governance principles are likely to be relevant also for e-government.

2.3 IT Governance

IT governance consists of the leadership, organisational structures, and processes that ensure that an organisation's IT sustains and extends its strategies and objectives (Guldentops, 2001). Peterson (2003) distinguished between IT management and IT governance. IT management focuses on internal business-oriented issues and short-term operational matters. IT governance deals with an external business perspective and takes a longer-term view. IT governance aims to match the expectations and achievements from IT, while controlling IT risks. In particular, IT governance focuses on the strategic alignment between an organisation's use of IT and achievement of its business goals and objectives, an issue that also appears important to e-government. As IS is positioned within organisational settings and involves people, IT governance considers much broader issues than technology, and requires a holistic approach. These issues include policy, planning, culture, training, and change management. Because poor IT governance is a major explanation for failure to achieve the goals from IT-related projects (Weill and Ross, 2004), we anticipated that the e-government literature would include explicit discussion of the relationship between IT governance and e-government's shortcomings.

A search of multiple databases in the vast ProQuest resource failed to identify scholarly papers that gave more than a passing mention to the role of IT governance in e-government. We found no papers that considered the relationship between e-government and a holistic approach to IT governance, while using the latter term. While we identified some papers that considered some related aspects, they did not draw upon the growing expertise embodied within the IT governance literature. As an example, Ebrahim and Irani (2005) proposed an integrated architecture framework for e-government that aligned IT infrastructure with business process management. That paper was oriented towards IT managers (p. 589) rather than to those concerned with IT governance.

A Google search identified practitioner sites that promised effective e-government solutions as an outcome of implementing particular proprietary approaches to IT governance. It appears therefore that although there is implicit recognition of the importance of effective IT governance to e-government, investigators have conducted little explicit scholarly research in the area. This omission is surprising given the researcher attention paid to IT governance and empirical evidence of its contribution when undertaken well. For example, Boritz and Lim (2007) found that stronger IT governance enhanced both regulatory compliance and financial performance. Both these latter issues are also important for government. A possible reason for the apparent neglect of IT governance in e-government research to date is that development of models for e-government took place in isolation from both the government and IT literature (Coursey and Norris, 2008, p. 533).

We assume that at least IT governance is necessary for e-government projects to be successful. The apparent dearth of scholarly literature that explicitly examines the relationship between IT governance and e-government suggests that researchers give insufficient attention to IT governance in that setting. Inadequate IT governance of e-government implementations may account for at least some of the difficulties observed in achieving the potential of e-government. Later phase e-government implementations involve a diverse range of complex processes, demanding, it is assumed among other requirements, excellent IT governance and alignment between IT and organisational goals. Use of an IT governance framework is likely to help improve the quality of IT governance in this context.

2.4 An IT Governance Framework: COBIT

Some IT control frameworks have developed to direct the management of IT processes in a way that aligns them with business processes. COBIT is an IT control framework that bridges the gaps between business risks, control needs, and technical issues, and sets out IT governance best practice. Thousands of organisations throughout the world have implemented COBIT, including large public sector organisations such as the Australian New South Wales Department of Health and the United

States Department of Defense. Managers, IS professionals and IT auditors use COBIT to bring about more effective IT governance. The COBIT framework is explained next.

The current version of COBIT, Version 4.1, sets out IT processes grouped into four IT domains: *Planning and Organization, Acquisition and Implementation, Delivery and Support,* and *Monitoring.* The 34 IT processes are broken down further into 210 detailed control objectives, each of which is identified by a unique code, such as PO9.4. PO9.4 refers to the *Risk Assessment* detailed control objective (9.4) from the domain, *Plan and Organise*. COBIT is designed to be comprehensive, guiding management in defining a strategic plan for IT, setting out the information architecture, identifying the hardware and software needed to implement IT strategy, monitoring the effectiveness of IT, and more. COBIT also contains a set of management guidelines and a tool designed to help organisations measure the maturity of processes developed for each of the 34 IT processes. A framework associated with COBIT called Val IT is designed to assist organisations to gain value from investment in IT. The next version of COBIT, Version 5, will integrate COBIT and Val IT.

The aim of this paper is to investigate the theoretical potential of using IT governance to overcome the obstacles of e-government identified from a data driven thematic analysis of the literature. The authors' purpose in doing so is to indicate for future investigation where IT governance has potential to reduce or eliminate particular barriers to e-government. A further aim of this study is to identify barriers that are outside the control of IT governance.

3 STUDY METHODOLOGY

COBIT is comprehensive as well as being the only IT governance framework designed to align IT process control with organisational goals. Therefore COBIT was selected as the schema for mapping IT governance and e-government barriers.

The major barriers to e-government were collated from a thematic analysis of 36 unique studies on barriers set out in Table 1 and referred to in Section 2.2. We drew the studies from Ebrahim and Irani (2005), Weerakkody and Choudrie (2005), Coursey and Norris (2008), Sarikas andWeerakkody (2007), and Lam (2005) because each classified multiple e-government barriers, collating the results from previous studies (with the exception of Lam 2005). Despite the number of studies listed in Table 1, it is possible that not all papers that classified barriers to e-government were identified. It is argued that only sufficient analysis is needed to identify the key issues until theoretical saturation is achieved, as is done when working towards concept development in primary qualitative research (Dixon-Woods, Agarwal, Jones, Young and Sutton 2005). Therefore if any studies were omitted that classified e-government barriers they are unlikely to have weakened the analysis and classification process.

The barriers identified in the studies showed considerable commonality while most of the studies classified the barriers in similar ways. The barriers identified in the studies needed to be mutually exclusive, as or close as it was possible, before being mapped to the IT control objectives in COBIT. We adopted a data driven approach to thematic analysis (Dixon-Woods *et al.*, 2005). A record was made of the taxonomy of barriers to e-government by Coursey and Norris (2008) in a column. The latter taxonomy was used as it was similar to those of Ebrahim and Irani (2005) and Lam (2005), but more comprehensive. Then we compared each of the barriers in the first study with the barriers in the remaining four studies, one by one. Where a). a barrier from one of the other four studies had not been addressed in the Coursey and Norris's taxonomy, b). it was not completely addressed or c). insufficient detail was provided in the taxonomy to tell, additional barriers were recorded in a second column of the same table. The researchers made no record if the barriers were the same. Using this method all the barriers identified in the 36 studies represented in the five studies were recorded uniquely, or as close as it was possible. Incomplete description in the taxonomies with a consequential lack of clarity may result in some repetition being present in the barriers. However, this characteristic will not weaken the results as analysis sought occurrence only from mapping to the control objectives in COBIT and not frequencies.

Once the researchers collated the barriers in this way, they compared each barrier against the COBIT framework at the detailed control objective level. Although COBIT is structured into domains, IT processes and detailed control objectives, the analysis at its most basic involved comparing each of the collated barriers with each detailed control objective from COBIT, using dichotomous coding decisions. When mapping a barrier to a detailed control objective, we made a record of the code of the detailed control objective next to the barrier in tabular form (see Table 2). To reduce complexity, we mapped only one detailed control objective from COBIT to each barrier, which was a limitation of this study. We regarded this limitation as acceptable, as the study aimed to explore the potential of the technique. A code recorded next to an e-government barrier indicated the potential of COBIT to address that barrier. No record of a code next to a barrier indicated that COBIT appeared to have little potential to address the barrier.

We examined intercoder reliability by having a second person trained in research methods independently code a random sample of the coding decisions. Before coding occurred considerable discussion took place between the coders to ensure they had similar assumptions about the meaning of the barriers. Lacy and Riffe (1996) used Schutz's formula to set minimal acceptable reliability levels for calculating target levels for reliability testing. The test method controls for measurement error arising from chance agreement. Using a 95% level of probability and the 85% level of agreement recommended for coding "meanings of content" (p. 969) Lacy and Riffe's (1996) guidance was followed to calculate that 142 units needed to be selected at random for comparison. Where the codes differed after examination of intercoder reliability, the researchers reached agreement from discussion on the code to record.

4 RESULTS AND DISCUSSION

Table 2 collates the major barriers for e-government from the five studies, using the COBIT codes listed in Table 3 which are grouped into COBIT's four domains.The barriers identified by Coursey and Norris (2008) appear in the left-hand column of Table 2. The researchers recorded additional barriers on the right-hand column of Table 2 where the Coursey and Norris study omitted a barrier from one of the other four studies. A record was also made of a barrier when it was only partly addressed by Coursey and Norris (2008). Where a barrier from another study was recorded already it was not duplicated.

Coursey & Norris 2008	Additional Barriers Not Fully Addressed by Coursey & Norris
Technical capabilities	Usability of websites W&C S&W PO8.1
Lack of technology/Web staff PO7.1	Lack of awareness S&W W&C PO6.5
Lack of technology/Web expertise PO7.2	Access to e-services S&W
Lack of info on e-govt applications S&W DS7.1	Lack of implementation guidance Lam AI4.4
Web site does not accept credit cards AI1.1	Lack of architecture interoperability Lam PO2.1
Bandwidth issues S&WAI4.1	Lack of knowledge re e-govt interoperability E&I PO9.3
Need to upgrade PCs, networks AI3.1	Complex processes & systems for redesign & integration E&I PO3.2*
	Incompatible data standards Lam PO8.3
	Lack of resources standards E&I PO3.4
	Inflexibility of legacy systems Lam, E&I PO3.2
	Limited integration capabilities of existing internal systems E&I PO3.2
	Limited integration across govt systems E&I PO2.1
	Integration technologies of heterogeneous databases are confusing E&I PO3.2
	Compatibility of software, systems, applicns E&I PO3.2
	Lack of documentation for custom systems in particular E&I PO8.2
	Lack of IT training in govt E&I PO7.4
	Shortage of well-trained IT staff in market E&I PO7.4
	Lack of employees with integration skills E&I PO7.4
	Developing website by unskilled staff E&I PO7.2
	Unqualified project manager E&I PO7.2

Political & organisational Lack of support from elected officials PO1.2 Lack of collaboration among depts. PO6.5 Staff resistance to change PO6.5 Resident resistance to change DS7.2 Lack of business/resident interest or demand PO6.5	Lack of strategy & frameworks S&W PO1.4 Lack of shared e-govt goals & objectives Lam PO3.1 E-govt policy evolution PO3.3 Over-ambitious e-govt milestones Lam PO10.1 Lack of trust S&W; W&C PO6.5 Language barrier W&C Lack of governance Lam ME4.1 Access to e-services S&W W&C Generation gap W&C DS7.1 Lack of ownership Lam PO4.9 Absence of an e-govt champion Lam PO4.2 Lack of implementation guidance Lam PO7.4 Data ownership Lam PO4.9 Lack of agent readiness Lam PO6.5 Slow pace of govt reform Lam ME1.4 Legacy govt processes Lam PO4.1 Lack of in-house management expertise Lam PO7.1 Lack of common architecture policies & definitions E&I PO2.1 Flow of IT specialist staff E&I PO7.1 Lack of effective leadership support & commitment amongst snr public officials E&I PO1.2 Lack of vision & mgt strategy E&I PO1.2 Complex business processes E&I PO4.1 Politics and political impact E&I PO4.2 Cultural issues E&I DS7.1 Resistance to change by high level mgt E&I PO4.2 Reengineering business processes is time consuming in public organs E&I PO4.1
Legal Issues related to convenience fees for online transactions PO9.3 Privacy issues ME3.2 Security issues DS5.1	Data protection laws S&W ME3.1 Security laws W&C ME3.1 Different security models Lam ME3.4 Concern over citizen privacy Lam PO9.3 Threats from hackers & intruders E&I DS5.10 Threats from viruses, worms & Trojans E&I DS5.9 Unauthorised external & internal access to systems &info E&I DS5.3 Lack of knowledge for security risks & consequences E&I PO7.4 Assurance that transaction is legally valid E&I ME3.4 Lack of security rules, policies, privacy laws E&I PO7.4 Inadequate security of govt hardware & software infrastructure E&I DS5.1 Lack of risk mgt security program E&I PO9.1 Unsecured physical access to building or computing rooms E&I DS5.2
Financial Difficulty justifying ROI PO5.5 Lack of financial resources PO5.1	High cost of security applicns & solutions E&I PO5.4 Shortage of salaries & benefits in public sector E&I PO5.5 Central govt provides most funding E&I Shortage of financial resources in public sector orgns E&I High cost of IT professionals & consultancies E&I IT cost is high in developing countries E&I Cost of installation, operation & maintenance of e-govt systems E&I PO5.4 Cost of training & system devt E&I PO5.4

Note: S&W: Sarikas & Weerakkody (2007); W&C: Weerakkody & Choudrie, J. (2005); E&I: Ebrahim & Irani, Z. (2005); Lam: LAM (2007).

Table 2. Collated barriers to e-government from five studies. The barriers have been mapped to COBIT's detailed control objectives, using COBIT's codes.

Using Lacy and Riffe's (1996) method for testing intercoder reliability, the percentage of agreement between the coders for the sample was 85.1%. As the reliability figure exceeds 85%, the chances are 95 out of 100 that agreement between the coders will exceed 0.80 if both coders coded all comparisons

and then measured reliability (p. 967). This level of agreement is appropriate when comparing codes that involve interpreting meaning (Lacy and Riffe, 1996, p. 979; 973).

Domain	Code	Detailed Control Objective
Plan & Organise (PO)	PO1.2	Business-IT Alignment
	PO1.4	IT Strategic Plan
	PO2.1	Enterprise Information Architecture Model
	PO3.1	Technological Direction Planning
	PO3.2	Technology Infrastructure Plan
	PO3.3	Monitoring Future Trends and Regulations
	PO3.4	Technology Standards
	PO4.1	IT Process Framework
	PO4.2	IT Strategy Committee
	PO4.9	Data and System Ownership
	PO5.1	Financial Management Framework
	PO5.4	Cost Management
	PO5.5	Benefit Management
	PO6.5	Communication of IT Objectives and Direction
	PO7.1	Personnel Recruitment and Retention
	PO7.2	Personnel Competencies
	PO7.4	Personnel Training
	PO8.1	Quality Management System
	P08.2	IT Standards and Quality Practices
	PO8.3	Development and Acquisition Standards
	PO9.1	IT Risk management Framework
	PO9.3	Event Identification
	PO9.4	Risk Assessment
	PO10.1	Programme Management Framework
Acquire & Implement (AI)	AI1.1	Definition and Maintenance of Business Functional and Technical Requirements
	AI3.1	Planning for Operational Solutions
	AI4.1	Knowledge Transfer to Operations and Support Staff
	AI4.4	Knowledge Transfer to Operations and Support Staff
Deliver & Support (DS)	DS5.1	Management of IT Security
	DS5.2	IT Security Plan
	DS5.3	Identity Management
	DS5.9	Network Security
	DS7.1	Delivery of Training and Education
	DS7.2	Delivery of Training and Education
Monitor & Evaluate (ME)	ME1.4	Performance Assessment
	ME3.1	Identification of External Legal, Regulatory and Contractual Compliance Requirements
	ME3.2	Optimisation of Response to External Requirements
	ME3.4	Positive Assurance of Compliance
	ME4.1	Establishment of an IT Governance Framework

Table 3. Expansion of detailed control objective codes from Table 2.

Of the 83 detailed barriers identified, 26 related to technical capabilities, 31 related to political and organisational issues, 16 were about legal issues while the remaining 10 were financial in nature. Table 4 presents a ranking of these figures, along with the percentage for each category as a proportion of the total. Note that rounding error accounts for the figures not totally 100%. The highest proportion found for political and organisational barriers confirms the complexity of e-government. However, the results showed almost as many barriers of a technical nature as of a political and organisational nature. As IT governance considers political and organisational issues, as well as technical issues, the results of this analysis suggest the potential of IT governance to address the barriers to e-government.

Broad Category of Barrier (from Coursey & Norris 2008)	Frequency	Percentage of Total
Political & Organisational	31	37.3
Technical Capabilities	26	31.3
Legal	16	19.3
Financial	10	12.0
Totals	**83**	**99.9%**

Table 4. Breakdown of the nature of e-government barriers identified.

Some detailed control objectives from COBIT mapped completely to the barriers. For example, the barrier from Lam in the Political and Organisational category, *Data ownership* mapped to COBIT's PO4.9**,** *Data and System Ownership*. COBIT defined this detailed control objective as "Provide the business with procedures and tools, enabling it to address its responsibilities for ownership of data and information systems. Owners should make decisions about classifying information and systems and protecting them in line with this classification" (ITGI 2007, p. 42). Another example that mapped neatly was the legal barrier *Assurance that transaction is legally valid* from Ebrahim and Irani (2005). This barrier mapped to COBIT's ME3.4, *Positive Assurance of Compliance*. This detailed control objective was described in the following way: "Obtain and report assurance of compliance and adherence to all internal policies derived from internal directives or external legal, regulatory or contractual requirements, confirming that any corrective actions to address any compliance gaps have been taken by the responsible process owner in a timely manner" (ITGI 2007, p. 162). These and other barriers that mapped readily to COBIT without omission of any aspects appear to be those with most potential to be addressed through the use of IT governance.

Other barriers only partly mapped to COBIT's detailed control objective, even when the researchers tried multiple detailed control objectives. For example, another political and organisational barrier, *Slow pace of government reform,* identified by Lam (2005) mapped to ME1.4 *Performance Assessment*. This detailed control objective only partly addressed Lam's barrier, which also related to the IT process ME1, *Monitor and Evaluate IT Performance*. E-Government assessment needs to go beyond the evaluation of IT performance, and so partly falls outside the scope of ME1.4. Another barrier proposed by Coursey and Norris (2008) which they categorised as financial in nature was *Difficulty justifying Return on Investment (ROI)* which mapped to PO5.5, *Benefit Management*. While certainly "implementing a process to monitor the benefits" of providing e-government services will assist in arguing that there is a return on investment from e-government, it will not totally address justifying ROI, a difficulty discussed by Ward and Peppard (2002) particularly for strategic information systems.

It is likely that better mapping will occur from mapping some of the barriers to more than one detailed control objective from COBIT. However, a limitation placed on the method for this study was the mapping of only one detailed control objective from COBIT to each barrier, to reduce complexity. Moreover the last example discussed shows that mapping the barrier to additional detailed control objectives from COBIT would not have mapped the barrier totally. The barriers that mapped only partly to COBIT appear to be those that may have some but not total potential for mitigation by detailed control objectives. This finding demonstrates that researchers will need to find additional ways for overcoming e-government's barriers.

We could not map seven or 8.5% of the barriers to any detailed control objectives in COBIT. The unmatched barriers appear below in Table 5. These barriers appear to fall outside the scope of COBIT. Some of these barriers considered issues that were too focused and specific for COBIT. For example the financial barrier "IT cost is high in developing countries" proposed by Ebrahim and Irani (2005) considered a barrier that was specific only to some countries whereas COBIT is not designed to be region specific. Another example of a barrier that is entirely outside the scope of the COBIT framework to overcome is the financial issue from Ebrahim and Irani (2005), "Central government provides most funding". This example was too distant from IT-related issues to be included in the COBIT framework.

The results suggest that implementing IT governance through using the IT control framework, COBIT, may offer potential to redress some of the barriers to e-government. Of course, using COBIT does not guarantee effective implementation of IT governance, particularly as it sets out what to do to control IT processes rather than how to do it. However, the COBIT framework includes maturity models and management guidelines for evaluating and improving the quality of its implementation, while other frameworks like ITIL offer further practical guidance.

Access to e-services (from technical view)	Central govt provides most funding
Language barrier	Shortage of financial resources in public sector orgns E&I
Access to e-services (from organisation/political view)	High cost of IT professionals & consultancies E&I
IT cost is high in developing countries E&I	

Table 5. E-government barriers that could not be mapped to COBIT detailed control objectives.

The results also suggest that effective IT governance alone will not be sufficient to overcome all the barriers identified to e-government.

5 CONCLUSIONS

The study undertook a data driven thematic analysis of the barriers to e-government, drawing upon the results of 36 prior studies to identify 83 barriers, before categorising the barriers by their nature. This analysis will contribute to the body of knowledge on barriers to e-government.

It seems possible that the different training and backgrounds of IT governance and e-government researchers may have limited the explicit application of the former approaches to e-government. However, it is likely that the IT governance field has knowledge, tools and skill sets of value for problem solving in e-government. For example, the IT governance research community has a sophisticated understanding of how to achieve alignment between the use of ICT and achievement of organisational goals, knowledge that appears relevant for effective e-government.

By integrating knowledge from two separate fields, this investigation demonstrated a potential relationship between IT governance and e-government through mapping e-government barriers against the comprehensive COBIT IT governance framework. The results of this study suggest that IT governance, implemented through use of COBIT, may have potential to mitigate many of the barriers to e-government. This mapping provides a guide for future investigation by indicating where IT governance has potential to redress the barriers to e-government. The results also suggest where IT governance lacks the potential to do so.

The implications of this study may also be considered from an IT governance perspective, rather than from an e-government perspective, as has been adopted above. From an IT governance perspective, applying the concepts and approaches from IT governance to e-government give opportunity for broadening the scope of IT governance to a local, regional or even national government setting. Traditionally, the unit of analysis for the IT governance field has been more narrow, being applied at the corporate or public sector organisation level. Expanding the application of IT governance brings opportunities to demonstrate its value in regional and national settings, facilitating the application of theory and empirical work from the field to those contexts.

Future research will need to assess the contribution of IT governance to e-government through empirical analysis of e-government implementations, to test the potential of COBIT to mitigate the barriers. The results of this study propose detailed control objectives from COBIT that may be tested for their effect on e-government, and identity a list of seven barriers that need to be redressed using different approaches.

References

Boritz, E. and Lim, J. (2007). Impact of Top Management's IT Knowledge and IT Governance Mechanisms on Financial Performance. In Proceedings of the International Conference on Information Systems, 9-12th December, Montreal, Canada, Paper 88.

Chadwick, A. and May, C. (2003). Interaction between States and Citizens in the Age of the Internet: E-Government in the United States, Britain and the European Union. Governance: An International Journal of Policy, Administration and Institutions, (16)2, 271-300.

Chen, H. (2002). Digital Government: Technologies and practices" Decision Support Services, (34)3, 223-227.

Coursey, D. and Norris, D. (2008). Models of E-Government: Are they correct? An empirical assessment. Public Administration Review, (68)3, 523-536.

Davison, R., Wagner, C. and Ma, L. (2005). From Government to E-Government: A transition model. Information Technology & People , (18)3, 280-299.

Dixon-Woods, M., Agarwal S., Jones, D., Young, B. And Sutton, A. (2005). Synthesising Qualitative and Quantitative Evidence: A review of possible methods, Journal of Health Services Research & Policy, (10)1, 45-53.

Ebrahim, Z. and Irani, Z. (2005). E-Government Adoption: Architecture and barriers. Business Process Management Journal, (11)5, 589-611.

Grant, G. and Chau, D. (2005). Developing a Generic Framework for E-Government. Journal of Global Information Management, (13)1, 1-30.

Guldentops, E. (2001). Asking the Right Questions for IT Governance. Information Systems Control Journal, (4), 13-15.

Hu, G., Pan, W., Lu, M. and Wang, J. (2009). The widely shared definition of e-Government: An exploratory study. The Electronic Library, (27)6, 968-985.

ITGI (2007). COBIT 4.1. Rolling Meadows, IL, USA: ITGI.

Kaaya, J. (2009). Determining Types of Services and Targeted Users of Emerging E-Government Strategies: The case of Tanzania. International Journal of Electronic Government Research, (5)2, 16-36.

Lam, W. (2005). Barriers to E-Government Integration, Journal of Enterprise Information Management, (18)5/6, 511-530.

Marche, S. and McNiven, J. (2003). E-Government and E-Governance: The future isn't what it used to be. Canadian Journal of Administrative Sciences, (20)1, 74-86.

Norris, D. and Lloyd, B. (2006). The Scholarly Literature on E-Government: Characterizing a nascent field. International Journal of Electronic Government Research, (2)4, 40-96.

O'Toole, K. (2007). E-Governance in Australian Local Government: Spinning a web around community? International Journal of Electronic Government Research, (3)4, 58-75.

Peterson, R. (2003). Information Strategies and Tactics for Information Technology Governance. In (Van Grembergen, W. Ed.) Strategies for Information Technology Governance, Hershey, PA., USA: Idea Group Publishing.

Pina, V., Torres, L. and Royo, S. (2009). E-Government Evolution in EU Local Governments: A comparative perspective. Online Information Review, (33)6, 1137-1168.

Sarikas, O. and Weerakkody, V. (2007). Realising Integrated E-Government Services: A UK local government perspective. Transforming Government: People, process and policy, (1)2, 153-173.

Ward, J. and Peppard, J. (2002). Strategic Planning for Information Systems. 3rd Edition, Chichester, UK: John Wiley and Sons Inc.

Weerakkody, V. and Choudrie, J. (2005). Exploring E-Government in the UK: Challenges, issues and complexities. Journal of Information Science and Technology, (2)2, 25-45.

Weill, P. (2004). Don't Just Lead, Govern: How Top-Performing Firms Govern IT. MIS Quarterly Executive, (3)1, 1-17.