

# EXPLORING THE PROCESS AND INFORMATION SYSTEMS INTEGRATION ASPECTS OF E-GOVERNMENT

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## Abstract

*This paper explores the challenges that local government face in the UK when implementing fully integrated public services. The authors examine the degree of integration and harmonisation required between various stakeholders in government for the effective delivery of e-services. While process and information systems integration are identified in the literature as key challenges for realising fully functional e-government services; an empirical study found that broader technical, political, and organisational issues also need to be considered.*

*Keywords: E-government, Process, Information Systems, Integration, Web Services*

## 1 INTRODUCTION

The rapid pace of technological development has led to the integration of computers and telecommunication to unfold within public and private organisations. Albeit at vastly different speeds and levels of sophistication, successive governments around the world have demonstrated their determination to harness the power of technology for the benefit of service-state delivery, accountability, effectiveness, and openness in government.

E-government is a multidimensional and multidisciplinary field and its scope is a concept that is in a constant state of development (Jaeger, 2003). Given the diversity of e-government implementations, it is becoming increasingly difficult to identify a workable definition of it (Roy, 2003). Heeks (2001) classifies the scope of e-government as:

- *e-administration* – improving government processes by reducing costs, managing performance, making strategic connections and creating empowerment
- *e-citizens and e-services* – connecting citizens to government by consulting with citizens, supporting accountability, listening to citizens, supporting democracy, and improving public services

- *e-society* – building interactions beyond the boundaries of government by working better with business, developing communities, building government partnerships, and building society.

E-government activities can then be examined in terms of the interaction between sectors of government, business and citizens (Jaeger, 2003). Government-to-government (G2G) involves the communication between government and its agencies (central or local). Government-to-business (G2B) communication involves the procurement of goods and services between these two actors. Government-to-citizen (G2C) involves the interaction between the public and the government.

Therefore, in broad terms e-government involves any use of modern ICT at the global, state, party or civil societal level. While pledging to promote trust between governments and citizens, e-government encompasses a broad spectrum of activities that are offered using ICTs and allows an improved service of the government to citizens (Northrup and Thorson, 2003). This multiplicity of e-government may refer to a wide range of technical architectures and IS, different access channels and devices, distinct process structures, and stakeholders (Traummuller and Wimmer, 2003).

E-government is defined by Prins (2001) as the delivery of online government services, which provides the opportunity to increase citizen access to government, reduce government bureaucracy, increase citizen participation in democracy and enhance agency responsiveness to citizens needs, yet this proves to be extremely hard to achieve. In a narrower context and for this paper, the authors accept the notion that e-government is defined as the use of the ICT to procedures and outcomes of central and local government and their administrative structures (Chadwick and May, 2003; Wimmer, 2002).

Like many of its predecessors such as total quality management, business process reengineering and knowledge management, e-government is treated as a panacea for public sector modernisation and the number of worldwide e-government projects has increased since 1996 from three to more than five hundred national initiatives (Al-Kibsi et al., 2001) and growing. In Europe, plans are being made to speed up the deployment of e-services as an effort to modernise the public sector EU-wide (Cuddy, 2003). In the UK plans are focused towards realising fully integrated e-government services by 2005.

Indeed a classic technology-push solutions-oriented scenario, the management literature and industry solutions seem to provide models and tools to enhance and support control over network-enabled public services (Harvard, 2000; Mechling and Sweeney, 1998). Moreover, the concept of e-government has evolved from the domain of e-business where it requires enterprises to collaborate with partners, suppliers and customers for the effective delivery of e-services. In such an environment, enterprises need business processes that can be continuously optimised and expanded outside the enterprise and outside internal enterprise systems (Fustes, 2003; Champy, 2002). This requires the integration and communication between business processes and underlying IS/IT systems in disparate organizations, a task which is performed by enterprise application integration (EAI) technologies. Though, ideally implementing (or integrating) IT looks like a streamlined sequence of processes, it actually functions more like an unfolding event (Ciborra, 2000). The implementation of CRM for instance is equally striking because of the amount of care required (Ciborra, 2000: 100; 1996) by all the stakeholders involved, the effort needed for the alignment of organizational components and the technology needed to make the initial concept a reality (Ciborra, 2000; Latour, 1987).

EAI has been an issue open to both positive and negative discussion for many commercial organizations since the advent of computers and has continued to cause even more problems in the e-business environment (Linthicum, 1999; Sutherland and Willem, 2002; Themistocleous et al., 2004; Themistocleous and Irani, 2002;) where processes and IS/IT systems cross organisational boundaries (Champy, 2002; Themistocleous and Irani, 2003). These problems are multiplied in the government sector, where inefficient and bureaucratic business processes and disparate legacy IS/IT systems need to be integrated in an e-government environment. Given this context, the research question driving this

paper is, *what are the challenges faced by local government (LG) when implementing an integrated e-government service.*

Initial efforts to deploy e-government in the UK suggest that many local boroughs are lagging behind the national expectations for e-government due to various political, organisational and technical challenges (Irani et al. 2002; Weerakkody et al., 2004). Given this context, this research intends to offer a realistic perspective of the e-government initiative undertaken within the UK.

To explore further the arguments set out above, this paper is divided as follows. In the next section a literature review identifies the challenges facing e-government in the global context and examines the organisational and technical challenges that need to be addressed for realising a fully integrated e-government. To this end, the emerging web services concept and its significance to e-government service integration will be explored. This is followed in section 3 by a summary of the methods used to carry out the research discussed in this paper. Section 4 then presents the results of an exploratory study of local e-government implementation and the associated process and IS/IT integration challenges faced by local government. A discussion follows in section 5 and examines the process and systems requirements for integrating local e-government services. Finally, the paper concludes by summarising the main research findings and offering suggestions for realising integrated e-government services in the UK.

## **2 RESEARCH CONTEXT: THE NEED FOR PROCESS AND IS/IT IMPROVEMENT AND INTEGRATION IN THE PUBLIC SECTOR**

With its increasing popularity e-government has rapidly become a political imperative at local, national and international level (Irani et al., 2002). It is expected that as e-government matures, there will be a plethora of benefits for governments, business and citizens alike, which include but are not limited to:

- modernisation of the whole machinery of government including reorganising and restructuring of public organisations;
- re-engineering of administrative processes to provide public services via modern access means;
- citizen/customer-centred service provision leading to a more active participation in government and democracy;
- integrating tools and connecting organisations and people, over time and distances
- making laws, regulations of policies and government information easily accessible, and keeping citizens and business better informed about such services;
- increasing the transparency of government processes, services delivery and decision making;
- greater international cooperation on issues of law enforcements, regulations of trade and joint policy delivery.

(Traunmuller and Wimmer, 2003; Chandler, 2002)

Yet, how these benefits will be reached is still a matter of controversy. Despite the feasibility and availability of the technology, government agencies have confronted many problems in successfully developing and implementing ICT systems. However, with experience of e-government growing in different parts of the world, empirical evidence is being produced within government agencies and industrial organisation domains (West, 2002) offering a practical slant to e-government. While such research is invaluable for the further development, understanding and promotion of e-government initiatives, the success of e-government will largely depend on the benefits and level of usefulness of the services it offers to citizens (Holden *et al.*, 2002; Araujo and Grande, 2003).

As with any other new technology or organisational concept, the introduction of e-government to a country will also result in a number of challenges for the citizens and governments alike (Margetts and Dunleavy, 2002). Overcoming these challenges therefore would be one of the biggest tests for the government and citizens of any country planning to implement the concept. Research on e-government has identified issues such as lack of awareness (Reffat, 2003), access to e-services (Fang, 2002; Darrell, 2002), usability of e-government websites (Porter, 2002; Sampson, 2002), lack of trust (Navarra and Cornford, 2003; Bhattacharjee, 2002), security concerns (Harris and Schwartz, 2000; Javenpaa and Tractinsky, 1999; resistance to change (Margetts and Dunleavy, 2002), lack of skills and funding (Federal Computer Weekly, 2001), data protection laws (Bonham *et al.*, 2003; Harris and Schwartz, 2000), and lack of strategy and frameworks (Reffat, 2003) are hindering the adoption of e-government in many countries.

Similar to the private sector, support for governmental applications of ICT, such as e-government, is driven by pressures to reduce spending whereby, in theory, exploiting the continuing fall in costs and increase in capabilities of ICT. Despite the visionary thinking, successive governments have increasingly recognised the problems of successfully developing ICT systems. Over the past five years, high profile ICT difficulties have affected the UK's child support agency, passport office, criminal records bureau, inland revenue, national air traffic services, the department for work and pensions and not to forget the London ambulance service, among others (POST 2003, 1998; McGrath, 2002). In 2003, the UK's public accounts committee (PAC) reported that the government had 100 major ICT projects underway, with a total value of £10 billion (PAC, 2002; POST, 2003). The spending review of 2002 allocated approximately £6bn over three years to government electronic service delivery (Office of the e-Envoy 2002). In comparison, U.S., public sector spending on e-government solutions was predicted to go from \$1.5 billion in 2000 to \$6.5 billion in 2005 (Chircu & Lee, 2003). Given the governments' high investment budget, the complexity of large-scale ICT projects and the public demand for better public services, the government must take every measure to assess the performance of its local and national efforts and take into account the overall payoff from e-government (benefits, costs and risks); be it human, social, technical or fiscal.

The parliamentary office of science and technology (POST) reports that according to Computing magazine, the cost of cancelled or over-budget government ICT projects over the last six years is greater than £1.5bn (POST, 2003; Computing, 2003). With the governments' target for modernising and digitising all its services by 2005, pressure is now increasing to address the causes of ICT development failure in the public sector.

The current program of e-government in the UK focuses on e-enabling local authorities in different regions in the UK with plans to implement a fully integrated service by 2005. In the national context of the UK, the [direct.gov.uk](http://direct.gov.uk) web portal provides a single point of contact for e-government, but is yet to function as a proper web portal [one that offers a gateway to local and national government websites and provides a single point of contact for online service delivery (Gant and Gant, 2001; Burns and Robbins, 2001)]. Given this overall context, Layne and Lee's (2001) representation of the different stages and dimensions of e-government development is significant (figure 1). As outlined in figure 1 it captures the process transformation and integration aspects and the scope needed for a one-stop e-government web portal.

The modes of evolution and stages of maturity of e-government, which outline the multi-perspective transformation within government structures and functions.

Layne and Lee (2001) argue that there are four developmental stages of e-government based on their observations of 'current' practices. The authors suggest that e government is an evolutionary phenomenon and therefore e-government initiatives should be accordingly derived and implemented. In this regard, this paper posits four stages of a growth model for e-government: (1) cataloguing, (2) transaction, (3) vertical integration, and (4) horizontal integration. These four stages are explained in terms of complexity involved and different levels of integration below.

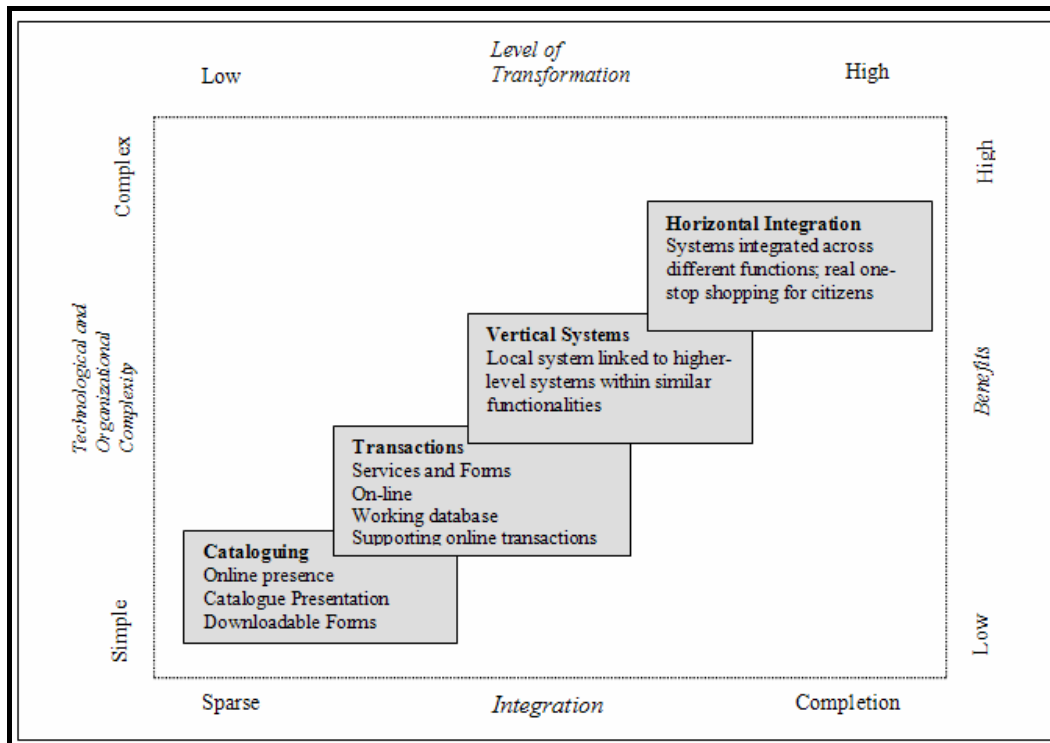


Figure 1: Dimensions and Stages of E-Government Development (Adapted from Layne and Lee 2001)

In stage one (cataloguing), initial efforts of state (local) governments are focused on establishing an on-line presence. Examples of functionalities at this stage are mostly limited to on-line presentations of government information. At this end of the first stage of e-government evolution, governments begin to establish index pages or a localized portal site in which scattered electronic documents are organized so that citizens can search for and view detailed government related information and download necessary forms. This first stage is called 'cataloguing,' because efforts are focused on cataloguing government information and presenting it on the web but it can be also depicted by the "push" of the managerial government model.

In the second stage (transactional), e-government allows citizens to transact with e-government electronically and at this stage, e-government efforts consists of putting live database links to on-line interfaces, so that citizens may proceed with government-to-citizen transactions. Eventually as the quantity of transactions increases, government will integrate their back office systems as the critical benefits of implementing e-government are actually derived from the integration of underlying processes not only across different levels of government but also different functions of government "one-stop shopping" concept. Also, from the viewpoint of all levels of government, this could eliminate redundancies and inconsistencies in their information bases for citizens.

Layne and Lee (2001) point that this integration may happen in two ways: vertical (third stage) and horizontal (fourth stage). Vertical integration refers to local and central governments connected for different functions or services of government. In contrast, the authors define horizontal integration as integration across different functions and services. This last stage of the e-government framework represents an utopian digital one-stop environment in which citizens have on-line access to ubiquitous government services with levels of government and the functional walls inside government transparent to them.

The four stage model offer a way to map the evolution and sophistication of the e-government services both in terms of the organization and technical aspects. Gant and Chen (2001) state that, different countries around the world have strived at different speeds to move from the *cataloguing* to *transaction* stage. The UK is no exception where the country has managed to realise transaction level services in key public service processes such e-billing, e-payments, e-voting and e-forms (Weerakkody *et al.*, 2004). Also, some UK local authorities and public sector institutions have already reengineered and integrated disparate business processes and IT systems to offer the public a more integrated service across different disciplines by collaborating with leading software and technology providers in the country (Infoconomy, 2004).

Although the above mentioned cases are encouraging, it can be argued that the transfer of public administrative processes from a largely inefficient and bureaucratic manual state to an e-enabled real-time automated state would involve, in some countries fundamental changes to processes at both local and national government levels. In regards to this a range of typical public administrative processes such as accountability arrangements, budgeting, monitoring and reporting, decision-making and performance management can be reengineered with the influence of ICT (Navarra and Cornford, 2003). However, the level of ICT enabled change to state services will depend to a large extent on the ICT resources available to the different governments (Gant and Gant 2001) and their attitude to IT enabled change (Heeks, 2000).

## 2.1 Addressing the Information and Communication Problems in Public Sector

There are also many instances where information is clearly not available locally (within the organisation) to execute processes and service specific customer demands. As said before, this adds a further complexity to the process, as information now may need to be obtained from an external source outside the organisational boundaries of local government/councils. Like in e-business, access to this information is needed at electronic speed in e-government, and thus demands instant communication and integration between processes and information systems in different agencies. This communication process is further illustrated in figure 2 (which is a modification of the work by Saxena and Wadhwa 2003, p130).

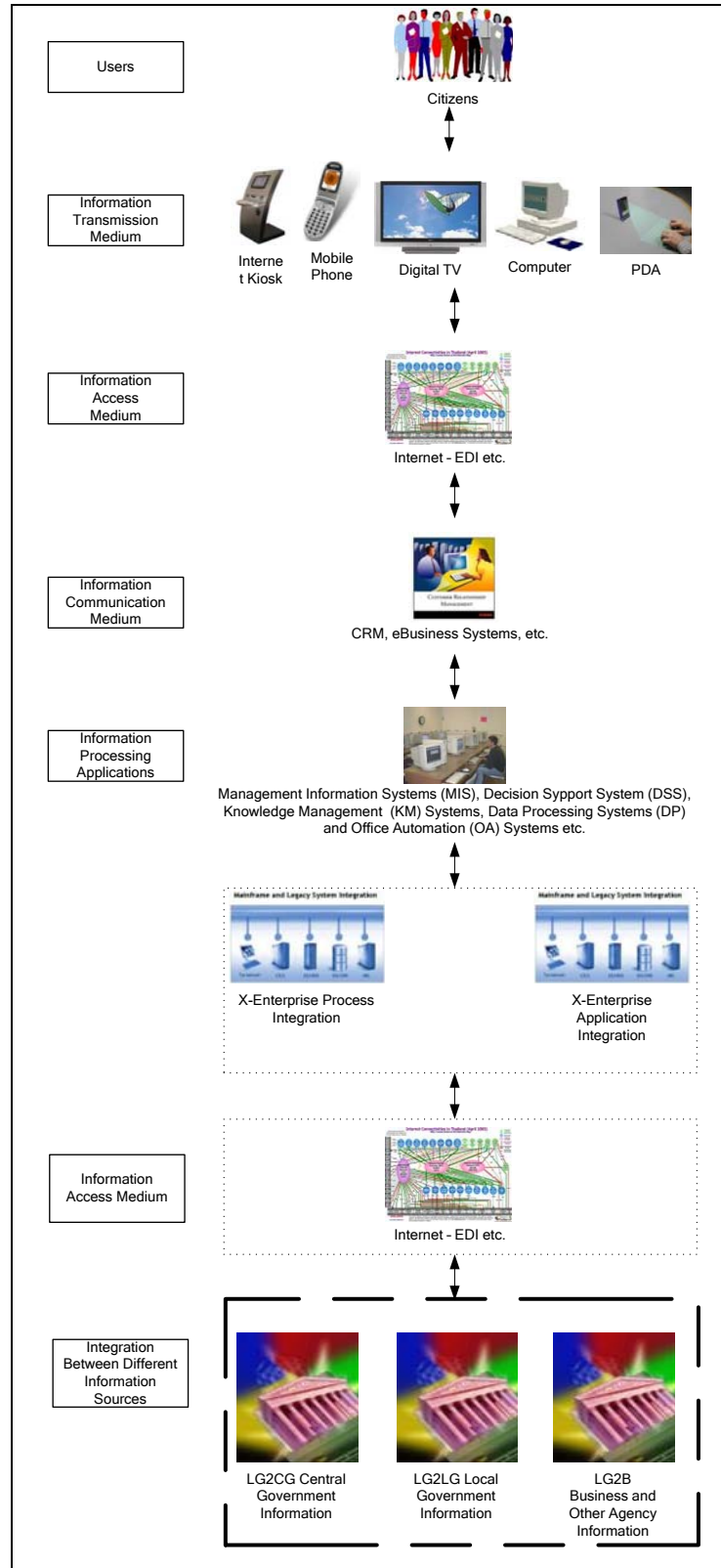


Figure 2: Information Communication and Processing Infrastructure in E-Government

Given the above context, e-government needs an environment where integration and interoperability between disparate IS/IT systems is seamless. It is fair to suggest that realising this type of environment using traditional modes of EAI is inconceivable given the nature of the diverse hardware and software systems that span government IT infrastructures (as in figure 2). Given this context, the emerging concept of web services cannot be ignored.

Web services breakdown applications into reusable components or services and enable the linking of these services within and across the enterprise using standards based on extensible mark up language (XML) (Fustes, 2003). It uses three XML based standards: SOAP (simple object access protocol) for transmitting XML-encoded data and remotely accessing services in a platform independent way; UDDI (universal description and discovery language) for registering and discovering services; and WSDL (web services description language) to provide an XML grammar for describing available web services (Monson-Haefel, 2004). In comparison to the most common traditional EAI method, electronic data interchange (EDI), XML is specifically designed to use the Internet as the data transfer mechanism whereby business documents and services can be freely exchanged electronically, whereas the latter needs point-to-point connection between each participating system (Thompson, 2002).

When using web service, the existing application in the enterprise remain, but instead of staying in relative isolation from each other, they are seamlessly joined to create new services that are more attuned to the needs of the business (Fustes, 2003). Currently, the two main application servers for distributed computing, Microsoft's .Net and SUN's J2EE both support web services (Monson-Haefel, 2004; Information Age 2004a).

Web services helps EAI by providing the tools needed to manage end-to-end extended processes independently of the execution platform (Masood, 2002; Monson-Haefel, 2004). This is enabled through the use of SOA's, where, when the business needs to automate a business function or process, it merely plugs into a service like logging onto a website irrespective of whether this may be an internal application, or an external application that may be accessed over the Internet (Lawrence, 2004). Already organisations in the US such as DaimlerChrysler (Information Age 2004b) and Jersey Post (Information Age, 2004b) and UK supermarket chains Sainsbury's (Information Age, 2004) and Tesco's (McIever, 2002) have used the web services-SOA model to integrate their supply chains. Given this context, it is fair to suggest that government can draw from these successful cases of supply chain integration in their efforts to implement e-government.

### **3 RESEARCH APPROACH**

To explore the arguments set out above in a deep and meaningful manner, a case study approach was considered to be suitable (Yin, 1994; Walsham, 1993; Pettigrew, 1990) and begun at a large local authority/council in November 2004. Semi-structured interviews (Yin, 1994) lasting around 2 hours were initially conducted with 10 council staff ranging from the head of e-government to middle management, IT staff and operational level employees. Follow-up structured interviews were thereafter arranged with the same staff in order to confirm the results and clarify any unclear information (Yin, 1994). This was complemented with further interviews with 20 local citizens between the ages of 16 to 84 who came into council X's offices. The interviews with citizens were focused and brief in contrast to staff interviews, and lasted between 5 to 10 minutes; this allowed the researchers to understand the e-government challenges from a citizens' perspective. Notes were taken during the interviews in a logbook (interviews were not tape-recorded as requested by the interviewees) and later transcribed into the computer.

The interviews were combined with observation and a review of council documentation, which allowed the researches to verify and validate the empirical finding through triangulation (Yin, 1994; Denzin, 1989; Mason 2002; Saunders et al., 2000; Ragin, 1987). Finally, the data analysis was done by comparing the different findings against each other and initially forming themes, which were later merged/divided and categorised into appropriate headings. The research approach taken is outlined in figure 3.

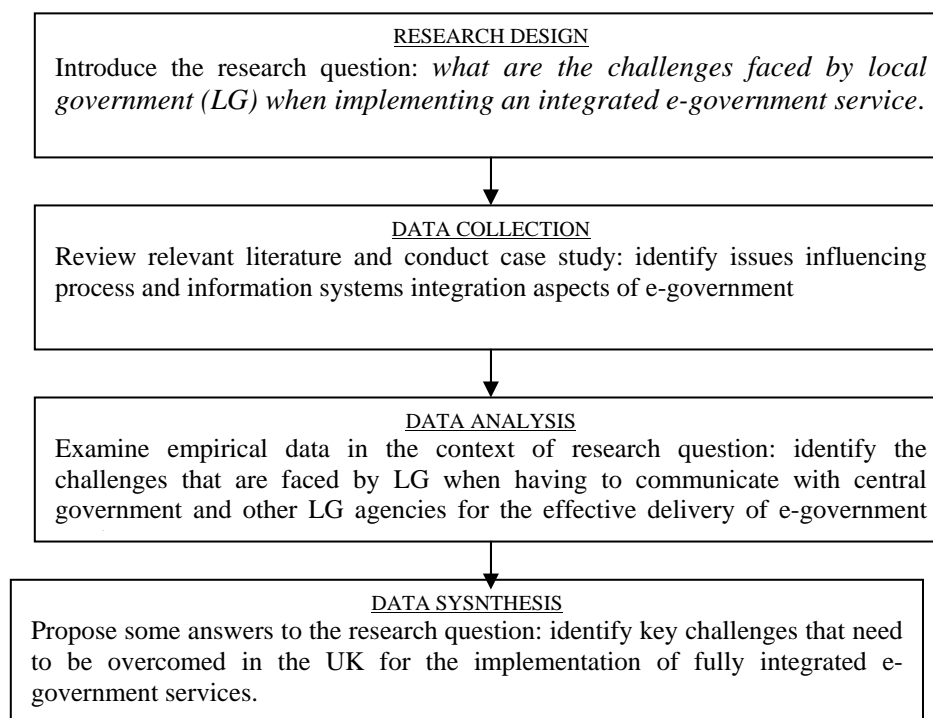


Figure 3: The Research Approach

#### **4 EXPLORING THE PROCESS AND IS/IT INTEGRATION CHALLENGES IN LOCAL GOVERNMENT: A CASE STUDY AT COUNCIL X**

Council X was formed in 1977 and is London's largest borough with a population of 331,370 citizens from diverse ethnic groups. In support of the UK e-government initiative, the council has initiated a number of projects aimed at improving their ICT infrastructure and delivering public services electronically. However, council X has duly recognized that much more needs to be done before the council could realistically support the central governments plans to offer fully integrated e-government services by 2005 in the UK. Accordingly, a senior councillor has been appointed as Head of E-government to lead the initiative forward in council X and a business unit has been formed involving a team of experienced council staff. This unit has outlined the implementation of the following services shown in figure 4 as imperative for the success of e-government at council X.

1. An ICT infrastructure that will meet the future needs of modern service delivery
2. A single set of customer records
3. A telephone contact centre
4. Free Internet access to citizens in public places such as libraries
5. One-stop-shops for local council services
6. Public access kiosks
7. Business Transformation to improve local services

Figure 4: Council X's Long Term Strategic Plan for E-Government

In relation to the arguments set out in section 2, some of the above initiatives listed in figure 4 (such as access to a single set of customer records, one stop shop, public access kiosk) will require the integration, harmonization and free exchange of information between different business processes and underlying IS/IT systems for them to succeed. Our interviews with the e-government project team and staff identified the following challenges that council X needs to overcome if they were to successfully implement the above-mentioned projects. These challenges are presented below in the context of the progress made thus far by council X and what needs to be achieved still in relation to Layne and Lee's (2001) framework for e-government service delivery/integration.

#### 4.1 Cataloguing Information

Like many other local councils in the UK, council X has implemented an e-government website with information about local services. Also, under the e-government initiative, council X offers free internet access to citizens in local libraries; provides e-mail addresses to all council staff (so that citizens can communicate with staff electronically); offers access to relevant council papers and information about council tax referendums etc. online; provides IT training to council staff and local citizens; and facilitates internet access to all local schools.

#### 4.2 Enabling on-line Transactions

The current ICT infrastructure in place at council X does not provide an adequate platform for process and IS/IT integration and thus restricts the sharing of resources and information. As outlined by a number of IT staff, council X has internal databases with citizens' records showing information such as council tax, social services benefits, parking permits and library cards. However, these databases and systems processing the information are all dispersed within different departments and citizens have to contact these departments to access different services. Furthermore, the IS/IT infrastructure in council X is made up of ailing legacy systems which are unable to support many of the citizens' queries online; contact has to be made in person at the council's offices which was seen by IT staff as 'failing to fulfil the e-government promise'. Also, it was clear that IT staff were struggling to cope with their increasing workload and the demands made on the existing legacy systems as a result of e-government. On the positive side however, the council has implemented a secure server with firewall protection, virus checker and password authentication. Although these improvements are beginning to encourage a digital medium, it is clear that much more is required to compliment these facilities.

#### 4.3 Vertical Process and Systems Integration

Interviews with council staff identified a highly ineffective vertical communication and information exchange mechanism between local and central government. For instance, currently, when a citizen has a specific query, the council employee dealing with the query has to telephone or fax central government (CG) for information. One interviewee highlighted that, "Calling central government is a

pain, they put us on hold for a long time and even when they answer the phone the call gets transferred from one place to another. Writing letters is much easier to do, but even then it takes them at least two weeks to get back to us.” When information has to be communicated in the opposite direction (i.e. CG to LG), the situation is no better. The council currently receives all new information regarding policy changes, benefits and services etc., in hard copy format by post. This information is then passed on to the relevant departments. In this respect, one interviewee highlighted the concerns of many staff by stating, “often information is lost or misplaced and we don’t have important information available to us.” Unfortunately, this scenario indicates that the exchange of information at vertical level is ineffective and thus poses a challenge not only to council X, but central government as well.

#### 4.4 Horizontal Process and Systems Integration

Horizontal communication and information exchange at council X is no better than the vertical scenario described above. Considering that council X has identified the need for a single set of customer records as a key requirement for their e-government efforts, currently staff have to phone or fax other departments to obtain different customer records. For instance, entitlement for certain state benefits and services often require information and verification by a number of different departments both at local and central government level. In such cases, staff have to wait for replies from various entities before they could discharge the citizen’s benefit or service entitlement. It was revealed that this could take days, and sometimes even weeks or months leaving the citizens helpless.

From the citizens’ perspective, the most influential factor for all the citizens interviewed was the long times spent in council X’s offices waiting to be served. Although citizens collect a numbered-ticket upon entering the council, a citizen voiced her concern by stating, “I only need to talk to the education department but I have to wait until my number comes”. It was also observed that although staff in certain departments were free, yet citizens requiring the service of these departments had to wait with everyone else until their number was called in the common ticketing system. Also, council X had a policy of different queues for different departments (meaning that if a citizen has two queries such as on education and housing, he/she has to queue up twice). Therefore, having a common ticketing system did not make any sense and contributed to further confusion and added waiting time for citizens.

While addressing the above challenges require commitment and resources, the e-government effort at council X is further compounded by funding issues. Interviews with the IT manager found that council X is finding it difficult to obtain funding from central government for their e-government efforts. Each year, funding is given in packages and the IT managers are under increasing pressure to deliver e-services with the limited financial resources. It was revealed that council X is currently in debt to the central government and any increases to the IT budget is unlikely in the near future. One manager highlighted the financial constraints faced by the council by stating, “Citizens are always demanding less council tax and better services, but, without investment for E-government it is not possible to deliver the services they require”.

## 5 DISCUSSION: A ONE-STOP-SHOP SOLUTION FOR LOCAL GOVERNMENT

The case study conducted at Council X identified a number of key issues that needed to be considered if the council was to realise an integrated e-government service by implementing a ‘one-stop-shop’ type web portal for the citizens. This can be made available as a website via the Internet and accessed using a PC, or in a kiosk format at communal / public places. Any proposed solution however needs to ensure increased efficiency and reduced cycle time, and as argued before this can only be achieved through the integration and harmonisation of processes and IT systems within LG and between LG and CG. Such a solution will not only allow better communication between different departments

within the council, but also between the council and central government. Some key issues that need to be considered include:

- the need for databases from different department to be integrated at LG level so that there is a single set of citizens records;
- the ability for LG employees to access the latest information from central government on their screens;
- data sharing should be possible between LG departments and central government;
- and online access for citizens to apply for e-services such as social care, disability allowances and facilities, education, health etc.

As said before, from the central government's perspective, progress has been made in the context of offering a one-stop-shop for key public service such as health, education, employment etc., by publishing the 'direct.gov.uk' web portal. However, it is fair to suggest that judging by the challenges faced by local government (such as council X), moving beyond the *cataloguing* stage to *vertical* and *horizontal* integration (as in figure 1) in the UK will require a great deal of process and information systems redesign work that will need to be supported by new integration technologies such as web services. As seen in council X, inefficient processes were further thwarted by fragmented information systems making the exchange of information between processes and systems impossible. Besides, empirical research in the UK strongly suggests that succeeding at the *local level* is key for national level e-government success (Hackney and Jones 2002). Also, many local residents hardly interact with central government in comparison to the level of interactions they have with local government (millions for central vs. 3-4 billion for local) (www.kablenet.com). Therefore, we argue that although the central web portal (direct.gov.uk) is a helpful resource, it does not encompass the need for good local e-government web portals in the UK offering efficient and user-friendly services.

Given the above context, moving from cataloguing to the horizontal integration stage in the e-government service delivery structure will require cross-functional as well as cross-organisational redesign of business processes and supporting software applications in government institutions, at both, local and national levels. Given the communication and information exchange problems at council X, the primary focus therefore needs to be the integration and improved communication between internal as well as external processes and IT systems. From an organisational perspective, the paradigm shift and change of culture that this may introduce to government institutions would certainly face resistance as seen in other forms of organisational change such as business process reengineering (Sahay and Walsham, 1997; Avgerou, 1993; Weerakkody and Hinton 1999). Moreover, it is imperative that the project planners and implementers understand how the various business processes, software systems and stakeholders that make up the e-government structure will interact with each other to provide integrated services.

Furthermore, the harmonisation and integration of business processes and supporting IS/IT systems between the main stakeholders (citizens, government agencies, employees, and business partners) are imperative in order to deliver services to citizens at *electronic speed*. While the integration between two or more of these entities may allow governments to deliver e-services at the cataloguing stage, in order to offer fully integrated e-services, the overall integration and harmonisation of all the above elements will be imperative. However, when even successful commercial enterprises are suffering with process and enterprise application integration (EAI) in the context of e-business and supply chain management (Linthicum, 1999; Sutherland and Willem, 2002), government institutions with

inefficient processes and outdated legacy systems will find this an even more Herculean task. Yet, the reality of having to reengineer these often inefficient and ineffective business processes and IS/IT systems before e-enabling them for e-government remains encouraging though, as this can promote a degree of standardisation across government institutions which may help ease the above problem. Moreover, we believe that this is where emerging technologies such as web service can offer a fast and effective solution to councils (like X) by helping to retain many existing (functional) applications in the council, but instead of staying in relative isolation from each other, they can be integrated to create new services that are more attuned to the needs of the citizens.

## 6 CONCLUSION

This paper has reported upon the progress made by one large local authority in their efforts to implement e-government in the UK. The research highlighted a number technical, financial and organisational challenges faced at local government level, and indicated that the actual implementation of e-government is a complex and lengthy task that may proceed well beyond the government's target of 2005. The authors argued that technical complexities such as the need to integrate business processes and technology across different government agencies present the most significant challenge to implementing a fully integrated e-government in the UK. While it is common for government agencies to have a plethora of information systems based on different hardware platforms, it is fair to state that many of these systems offer valuable operational and strategic support to these agencies. Therefore, we argue that the challenge is not to replace these systems, but to utilize them efficiently by enabling the communication and exchange of information between these systems using available-cost-effective technologies. Besides, with looming deadlines and limited resources the UK government cannot afford a large-scale radical reengineering of business processes and IT systems in local councils. Therefore, an incrementally-led process improvement effort supported by cost effective ICT's will no doubt offer a relatively risk-free transition from a largely manual to an e-service oriented local government.

Although this research was undertaken upon one local council, from the secondary data that is available it is known that these are factors that the national level of e-government is also facing. Furthermore, while most of the e-government initiatives are currently focused on providing information and basic public services, we believe that the success of e-government will largely depend on providing value added service to citizens. Therefore, as said before more research is needed to focus on exploring ways to improve interoperability and integration between different government agencies in the context of e-government. In this respect, the emerging concepts of Service Oriented Architectures and Web Services are areas that need further exploration.

While web services are the fastest growing solution to bridging legacy systems and streamlining information flow today, sadly organizations are reluctant to subscribe to the concept until they are securely and reliably able to leverage existing transport technologies and legacy environments (Masood, 2002). This problem is further compounded by the fact that the traditional application development model breaks down with e-business and e-government where in-house code and bound-in third party software from multiple sources needs combining (Ibid). Furthermore, choosing between the two main application servers currently used, Microsoft's .Net and SUN's J2EE is a strategic question for many. However, Microsoft and SUN are now working together with organisations such as IBM towards establishing standards and web services security, which is encouraging.

This research has attempted to offer a better understanding of the technological and wider organisational issues that may influence the realisation of a fully integrated e-government service through literature and empirical research. It has also examined the relevance of web services as an EAI platform for process and application integration in e-government. However, more research is needed to explore these issues and to this effect the authors have already planned more surveys and interviews with a number of local councils in the UK.

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