

E-Government: The Need for Effective Process Management in the Public Sector

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Abstract

The concept of e-government has evolved from the domain of e-business where enterprises need to collaborate with partners, suppliers and customers for the effective delivery of e-services. While needing integration and communication between business processes and underlying information systems in disparate organizations, in a non-process-oriented, legacy system driven public sector, this presents a significant challenge. Using a case study in a local council, this research will explore process management and integration issues in the UK public sector and highlight the opportunities for service improvement in the context of e-government implementation. While cross organisational process and information systems integration barriers are seen in the literature as presenting the main technical challenge for realising fully integrated e-government services, this research found that a legacy of bureaucracy and established illogical routine tasks were preventing the government from expediting their e-government initiative in the UK.

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

1. Introduction

The last two decades leading up to the new millennium witnessed various ways in which organisations leveraged information and communication technologies (ICT's) for

competitive advantage. While the early 1990's witnessed many private sector enterprises embarking on various management innovation and business improvement initiatives such as total quality management (TQM), business process reengineering (BPR) and knowledge management (KM), this also resulted in the manifestation of a customer services driven business environment. Thereafter, with the emergence of the Internet and a new array of associated ICT's in the mid-late 1990's management focus moved towards e-business. Following this example, governments around the world have also begun to invest into e-business concepts with a view to transform the public sector and deliver e-services. The e-services offered by governments are aimed at relaying information and public services to citizens over the Internet and is referred to in general as 'e-government'. While pledging to promote trust between governments and citizens [62], e-government encompasses a broad spectrum of activities that are offered using ICT's and allows an improved service of the government to citizens [31]. E-government is defined by Prins [34] 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.

There are many substantial benefits of e-government initiatives, including improved efficiency by reducing the time spent upon manual tasks, providing rapid online responses, and improvements in organisational competitiveness within public sector organisations [48]. Since the benefits of e-government became apparent, the number of worldwide e-government projects has increased since 1996 from three to more than five hundred national initiatives [1]. In Europe, plans are being made to speed up the deployment of e-services as an effort to modernise

the public sector EU-wide [9]. In the UK plans are focused towards realising fully integrated e-government services by 2008 [57]. However, 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 [45]. Given this context, this research intends to offer a realistic perspective of how public service processes are managed in the UK and the subsequent impact it may have on e-government implementation in the country.

E-government has evolved from the domain of e-business, and thus, for the effective delivery of e-services requires process and information systems (IS) integration and harmonisation between disparate organisations. In such an environment, enterprises need business processes that can be continuously optimised and expanded outside the enterprise and outside internal enterprise systems [14][7]. While the linking of these processes and IS require enterprise application integration (EAI) technologies, EAI has been an expensive and often problematic solution for many organisations engaged in e-business [25][41]. These problems are multiplied in the public 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 process management challenges faced by government when implementing an integrated e-government service*. Subsequently, the integration and interoperability features of web services are briefly examined as a possible solution to these challenges.

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. In this context, the emerging web services concept and its significance to e-government process integration will be explored. This is followed in section 3 by a summary of the methods used to carry out the research discussed in the paper. Section 4 then presents the results of an exploratory study in a local council in the UK by examining a key public service process and related process management issues. A discussion follows in section 5 and considers the process and IS redesign-requirements for integrating and e-enabling the selected process in the context of e-government. 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 Effective Process Management and Integration in the Public Sector

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 [26]. 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 [36], access to e-services [12][10], usability of e-government websites [32][38], lack of trust [30][4], security concerns [19][22][56], resistance to change [26], lack of skills and funding [50], data protection laws [5][19], and lack of strategy and frameworks [36] are hindering the adoption of e-government in many countries.

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 [47] offering a practical slant to e-government initiatives. 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 [21].

2.1 The Different Stages of E-Government

The implementation of e-government implies different objectives and levels of transformation in public services in different countries. For instance, in the USA, the main objective is to automate and integrate different islands of information to simplify and maximise the benefits of technology [30], whereas in Europe the emphasis is to modernise public services and offer better services to citizens [9].

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 2008. In the national context of the UK, the direct.gov.uk web portal provides a single point of contact for e-government, but is yet to function as a proper web portal (that offers a gateway to local and national government websites and provides a single point of contact for online service delivery) [15][6]. Given this context, examining Layne and Lee's [24] representation of the different stages and dimensions of e-government development is appropriate (figure 1). Figure 1 captures the process transformation and integration aspects and the scope needed for a one-stop e-government web portal.

[INSERT FIGURE 1 HERE]

In the *cataloguing stage* in figure 1, governments focus on establishing an online presence by publishing index pages or a localised site where electronic documents offer the public information relating to government services [24]. This is the simplest and least expensive form of web presence and from the government's perspective it helps to

save staff time spent on answering basic questions [5]. In the *transaction stage* the focus is on connecting the internal government systems to online interfaces thus allowing citizens to electronically transact with government institutions. While the speed of which this sector has progressed is disappointing, the process of developing and maintaining services in this stage are more complex than the first stage [43]. In the third stage, *vertical integration*, federal, state and local governments are expected to connect to each other to offer a higher level of integrated service. The main challenge is to ensure compatibility and interoperability between various government databases [24]. The most complex stage is *horizontal integration* where different services and functions within the same level of government are integrated to provide a one-stop-shop for all major services [36]. This according to Bonham *et al.*, [5] requires a transformation of how government functions are conceived, organised and executed and is more difficult to realise than the first three stages.

The above framework is not only hypothetical but has been researched in real life. Gant and Chen [16] 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 [45]. 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 [51]. A few such examples are the London boroughs of Newham, Merton, North Lankashire; the Inland Revenue Service; and the Southend Hospitals NHS Trust and Wigan and Leigh NHS Trust [51].

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 rethinking and radical redesign (as suggested in the case of business process reengineering (BPR) by Hammer and Champy [18]) of processes at both local and national government levels. In this context, 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 [30]. 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 [15] and their attitude to IT enabled change [20].

Also, due to the nature and the legacy of the often routine and repetitive processes being performed by

government institutions, a typical working culture and attitude (mindset) often begins to develop with most employees [27]. Furthermore, in some instances information that is needed to execute a process may not exist or is not known to the employee executing the process [27]. This is particularly significant for knowledge intensive processes such as those requiring administrative decisions or actions [2] or those processes that are a variation of the norm. 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.

2.2 The need for Process and IS Harmonisation

Given the above context, internal systems of government agencies will often need to request and interact with other organizations' information systems to extract the required information [39]. In an e-business or e-government context this process needs to be done at electronic speed and therefore ideally needs an environment where integration and interoperability between disparate IS/IT systems is exemplary. However, it is fair to suggest that realising this type of environment using traditional modes of EAI such as electronic data interchange (EDI) is inconceivable given the nature of the diverse hardware and software systems that span government IT infrastructures. In this regard, the emerging concept of web services cannot be ignored. Web services promises to offer a solution to the EAI problem through the use of business process management (BPM) and service oriented architectures (SOA)¹ where large service providers such as IBM, Microsoft, Sun and SAP are working together to develop a common platform and standards for modern EAI [14].

Web services break down 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) [14]. 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 [28]. Web services helps EAI by providing the tools needed to manage end-to-end extended processes independently of the execution platform [29][28]. 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

¹ SOA is a paradigm for designing, developing, deploying and managing discrete units of logic (services) within a computing environment.

application that may be accessed over the Internet [23][49]. In comparison to the most common traditional EAI method, 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 [42].

When using web service, the existing application in the enterprise remains, 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 [14]. Currently the two main application servers for distributed computing, Microsoft's .Net and SUN's J2EE both support web services [28][53]. Already organisations in the US such as DaimlerChrysler [54] and Jersey Post [54] and UK supermarket chains Sainsbury's [52] and Tesco's [55] have used the BPM-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 [61][44][33] and begun at one of the largest local authorities/councils in the UK in November 2004. The opportunity for the case study was made possible through personal contacts within the council. Semi-structured interviews [60][61] lasting around 2 hours were conducted with 4 local authority staff, including middle management, IT and operational level staff, and 1 representative from a partner organisation. All these interviewees were collectively responsible for delivering public services. This research was complemented with an interview with a citizen - who is the receiver of the service provided by government. Follow-up structured interviews were thereafter arranged with the same staff and citizen in order to confirm the results and clarify any unclear information [61]. Since the focus of this research was to explore process management and integration aspects of e-government, the questions were fairly focused. 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 researchers to verify and validate the empirical finding through triangulation [61][59][40][35][11]. 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 extent and geographic location (London) of the council and the nature of the process² selected for this study ensured good representation of the research problem.

4. Process Management in Local Government: A Case Study at Council Y

While a review of literature in the previous section identified numerous challenges that governments may face when e-enabling public sector processes from a theoretical stance, in this section we explore the impact of these issues in real life. Consequently, we examine the execution of a key public service process and related process management issues in one of the largest local councils in the UK (identified as Y). Located in northwest London, Council Y employs over 7,800 staff and owns 79 buildings that are available to the public. The services provided by council Y include central service departments (finance, law, administration and benefits services), housing services, library and community services, environment services and education. Council Y's electronic government statement in 2002 state that 'for council Y, e-government is about using ICT's to support the delivery of community strategy targets by making services more accessible, improving efficiency and supporting strong commitment to social inclusion'. With this statement the council has set its vision of what it hopes to achieve by January 2006.

Since the aim of this research was to explore process management and integration aspects in local government, as said above, the researchers chose to focus on a key service provided by the council, *the student loan application process*. Given this context, interviews were conducted primarily at council Y's Local Education Authority (LEA). These interviews identified a scenario where lack of harmonisation and integration between business processes and underlying IS/IT systems has resulted in inefficient and ineffective process execution and service delivery in local government (LG). Interviews with council Y staff that were responsible for the *student loan application process* identified two key activities relating to the process, which primarily revolved around the handling of different documents. These include processing the different applications received from students for loans and tuition fees (identified as PN1 forms) and confirmation of benefits (identified as CB2 forms). The first form (PN1) contains general information on the student such as personal details, income, parent's income etc., while the second form (CB2) contains information about any benefits the student or their parents claim.

Once the student has filled out the two forms (PN1 and CB2), an administrator manually enters the details onto the LEA Computer system. At the same time information provided on the CB2 form is checked against the benefits

² The process crossed organisational boundaries and thus illustrated well the horizontal process and systems integration challenges/problems that need to be overcome in the context of e-government.

agency records. Using this information the systems generates a financial assessment on the student, which is sent manually (by post) to an organisation known as the Students Loans Company (SLC). To complement the investigation conducted at the LEA, as mentioned in section 3, interviews were conducted with staff at the SLC, council Y's Benefits Agency and a student applying for the loan. The respective roles of these different entities and the sequence of activities that are executed to administer the student loan are outlined below.

Council Y's Benefits Agency: Council Y's benefits agency is just one of the local functions at Y. Their role is to provide benefits to citizens who are unemployed and are unable to work (such as income support and job seekers allowance). The LEA regularly needs information from the benefits agency to aid them in the process of making financial assessments for students. This is done using the confirmation of benefits-CB2 form. However, interviews with the benefits agency staff indicated that the LEA does not directly contact the benefits agency to obtain this information. Instead, the student is responsible to get part of the CB2 form completed by the benefits agency, which is then sent to the LEA by the student.

The Students Loan Company (SLC): The SLC is an organisation set up to pay the tuition fees to the student's university. The SLC also pays the student an instalment of loans throughout the academic year. The SLC does this by using the assessment information from the LEA. As noted earlier, interviews with staff at the SLC showed that there is no harmonization of processes and integration of systems between the LEA and SLC with the assessment information for every student being sent by mail on a regular basis.

The Student: Interviews with a university student currently in possession of a student loan confirmed the ineffectiveness of the lengthy process involved in the loan application process. It was revealed that the student applying for a loan and tuition fee payments, has to go through the same process every academic year. The student needs to fill out the first form (PN1) and the first section of the CB2 form. The student is then in direct contact with all the entities in the process including the LEA, SLC and the benefits agency. The student interviewed reported, "*this is a very time consuming and lengthy process*".

4.1 Current working model at the LEA in Council Y

By collating and analysing the information gathered from all the interviewees, the authors present below in figure 2 a composition of the current working model of the *student loan application process* at the LEA in council Y.

[INSERT FIGURE 2 HERE]

The diagram shows that the process begins with the student filling out two forms, which include the PN1, and CB2 form. The PN1 form goes to the college or university the student is currently attending. The CB2 form goes to the benefits agency, where one section of the form is filled out and given back to the student. Once the two forms are complete, these are handed over to the LEA. The LEA then uses this information to make an assessment on the student's eligibility for the loan using an IT system at council Y's office. Once the assessment is made, the LEA passes this information manually to the SLC.

With the financial assessment received from the LEA, the SLC then enters this information into their computer system and sends the student a loan request form and the assessment information made by LEA. The loan request form is used by the student to indicate how much money they want to borrow. Once the SLC has received the completed loan request form, they are then able to start with instalment payments to the student along with the tuition fee payments made to the student's university.

4.2 The Student Loan Application Process: Identifying the Key Problems

The scenario above clearly contradicts council Y's vision for e-government and highlights a number of process management problems in a key public service process. The first problem lies in the student handing the CB2 form to the benefits agency for them to complete one section of the form. If the student delays this process, this also delays the financial assessment process at the LEA in council Y. This is further compounded by delays that occur when the benefits agency is slow to give back the CB2 form to the student.

A second problem occurs with the exchanging of information between the LEA and SLC. The LEA receives a large number of requests from students, in particular during the period leading up to a new academic year, where each student loan application can take between 2-3 weeks to assess. Once these assessments are made they are then sent to the SLC by post. One LEA worker stated during the interviews that, "*using this method of communication can be sometimes troublesome when there are postal problems or delays*". This can cause delays and financial difficulties to the students receiving the loan as well as the university enlisting the student. Furthermore, delays in obtaining the financial assessment information can result in delays in the student's enrolment process at the university/collage.

The last problem occurs with the 'student loan request forms', which are sent to the students by the SLC. Delay can arise here again due to postal problems and lost or misplaced forms. This could mean that the student would need to contact the SLC and request a new form, which could take up to 1-2 weeks to arrive by post.

5. Discussion: Some Suggestions for Effective Process Management in Local Government

From the literature review and the case study above, it is clear that the effective delivery of public services will require harmonisation and integration of business processes and supporting IS/IT systems between various stakeholders such as, government agencies, business partners, employees and citizens. This is even more significant in an e-government setting where services are to be delivered to citizens at *electronic speed*. While a single entity on its own (such as council Y) may deliver e-services at cataloguing stage (see figure 1), in order to offer fully integrated e-services, the overall integration and harmonisation of all parties involved in the supply chain will be imperative. However, even when successful commercial enterprises are suffering with BPM and EAI in the context of e-business and supply chain management [25][41], 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 seen in the case of council Y.

Given the above context, in order to reap the benefits of e-services and e-government, the student loan application process needs to be significantly improved. It was clear from our investigation that the lengthy cycle time and resulting process inefficiencies were caused mainly due to lack of harmonization and integration of process and supporting IS/IT systems [7] between various internal and external entities in the context of council Y. Hence, it can be argued that radical improvements (as in BPR: [18]) to the process can be made that would not only transform the student loan application process from *manual* to *electronic*, but reduce the cycle time by well over 50%. This would however require the integration and harmonization of processes and IS/IT systems between the *LEA*, *SLC* and *Benefits Agency*. With a new integrated system the following requirements need to be realised:

- The student should be able to hand both forms (PN1 and CB2) directly to the LEA.
- When the financial assessment has been made by LEA, the SLC should be able to access the information electronically through a direct link.
- The student should be able to access their financial assessment online, eliminating postal problems that can occur with hard copies.
- The student should also be able to fill out the loan request form online.

In the context of e-government, the transfer of the *student loan application process* from a largely manual to an automated, e-enabled state would mean significant progress for council Y. Besides, empirical research in the UK strongly suggests that succeeding at the *local (council) level* is key for national level e-government success

[17][58] whereby local best practices can be mirrored at national level.

From an organisational perspective, the paradigm shift and change of culture that e-government would introduce to government institutions would certainly face resistance as seen in other forms of organisational change such as business process reengineering [37][3][46]. Furthermore, moving from cataloguing to the horizontal integration stage in the e-government service delivery structure (as in figure 1) will require cross-functional as well as cross-organisational process and IS/IT integration between government institutions at both local and national levels. Realising a fully integrated e-government service therefore will require a major reengineering of the business processes and supporting software applications in government institutions as seen in the case of council Y. This is true not only in the case of council Y, but also in a more general context in the UK [45].

While this research has identified significant process inefficiencies in the student loan application process, yet we can argue that this is only one example of how a public sector process may be executed. However, previous research by the authors has also identified similar inefficiencies with various processes in other local government /councils [45]. As stated before, these process inefficiencies are caused largely due to the lack of integration and synergy between various internal departments and external government agencies. Although in the past rectifying these problems would have meant radical reengineering of business processes and changes to underlying legacy systems that may have also resulted in the implementation of expensive EAI solutions, we agree that in the present context web services offer a realistic solution to this problem. The SOA – web services concept offers the platform for processes and systems to communicate in well understood universally accepted protocols such as XML and HTTP thus rendering them completely independent to different technologies and software that may be used by various government agencies. In Figure 3 we outline a model based on web services and SOA, which offers an integrated view of government processes and underlying systems in the context of e-government.

[INSERT FIGURE 3 HERE]

As outlined in figure 3, the various applications used by government agencies expose themselves as services based on XML-SOAP protocols irrespective of hardware-platform or software. The model in figure 3 is made up of three roles: service providers; user interface providers; and end-users (citizens in this case). Firstly, the government here has to assume the role of the service provider and needs to develop the infrastructure that enables them to expose their processes as web services. Secondly, the user interface providers have to provide user-friendly interfaces or application software to access these web services.

Typical examples of interface providers may include *google*, *msn* and *yahoo*. Their role here is to provide the channel for information to be passed between the user and the service provider. Finally, the users (citizens) can request for e-government information and services using various access mediums such as computers, PDA's, mobile phones and Kiosk. In an environment where there are disparate applications and hardware technologies (such as in the case of the public sector), the above model eliminates the need for major changes to software applications (legacy systems), which is both time consuming as well as costly. With tight budgets and project deadlines this is a luxury that many governments cannot afford.

6. Conclusion

This paper has examined the delivery of a key public service in the UK through a case study in a large local authority/council and considered process management and integration issues in e-government implementation. The research highlighted a number of technical and organisational challenges faced at local government level, which indicate that the actual implementation of e-government is a complex and lengthy task that may proceed well beyond the government's target of 2008 in the UK. 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 fully integrated e-government services in the UK.

While 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. Moreover, council Y is one of the largest local authorities in the UK and thus our findings do not reflect well on other smaller councils with fewer resources. The key challenge that council Y faced was the lack of coordination and integration between the various stakeholders involved in the public-service-delivery supply chain. This was further compounded by inbuilt process deficiencies and bureaucracy in the public sector. The case study clearly showed that local government needs to reengineer their business processes and IS/IT systems before they could effectively support the central (UK) governments e-government initiative. While reengineering can be done with proper planning, resources and commitment, 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 context, 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, organizations will not subscribe to the concept until they are securely and reliably able to leverage existing transport technologies and legacy environments [29]. 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 [29]. Furthermore, choosing between the two main application servers currently used, Microsoft's .Net and SUN's J2EE is a strategic question for many, although Microsoft and SUN are now working together with organisations such as IBM towards establishing standards.

This research has attempted to offer a better understanding of the technological and 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. Although the empirical research discussed here relates to one council in the UK, we argue that the extent, location and the ethnic diversity of the citizens represented by the council make the findings valid and relevant in the wider UK context. However, further 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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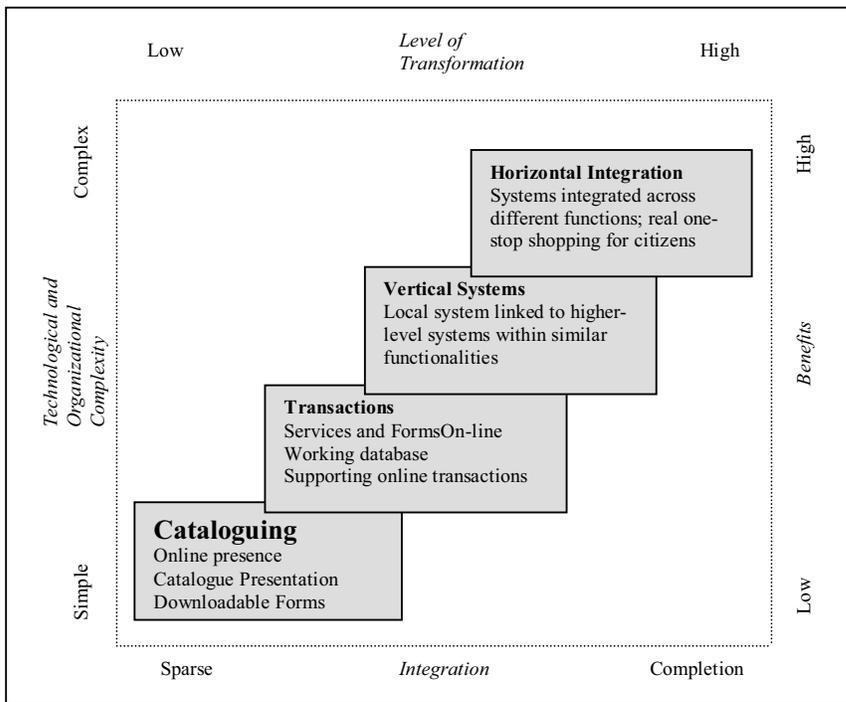


Figure 1: Dimensions and Stages of E-Government Development
(Adapted from Layne and Lee [24])

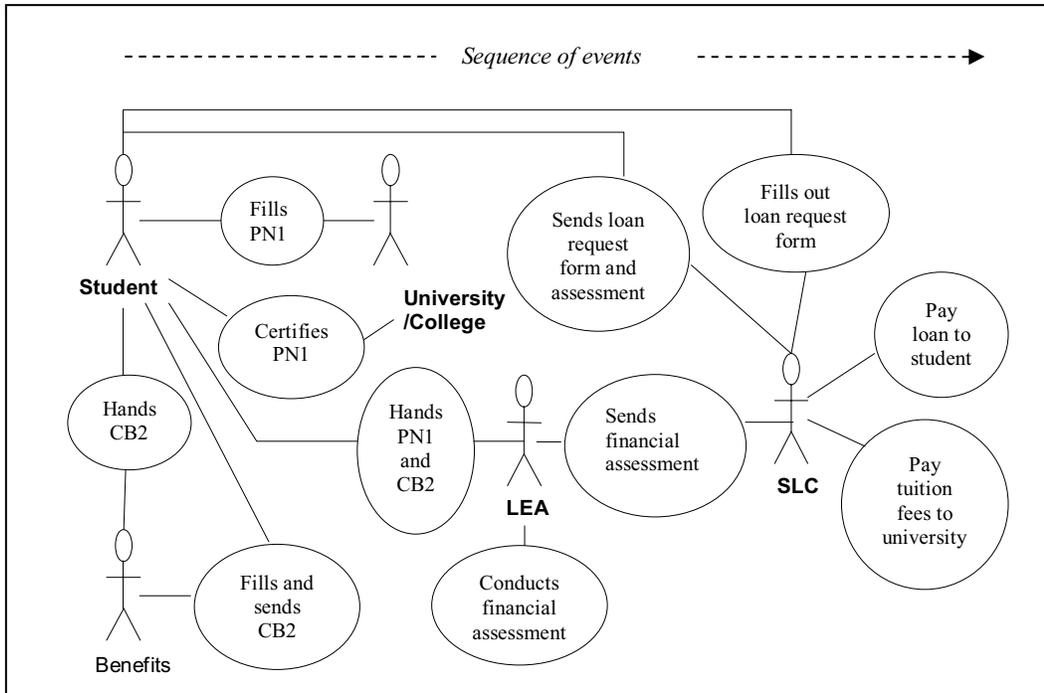


Figure 2: Student Loan Application Process - Use Case Model

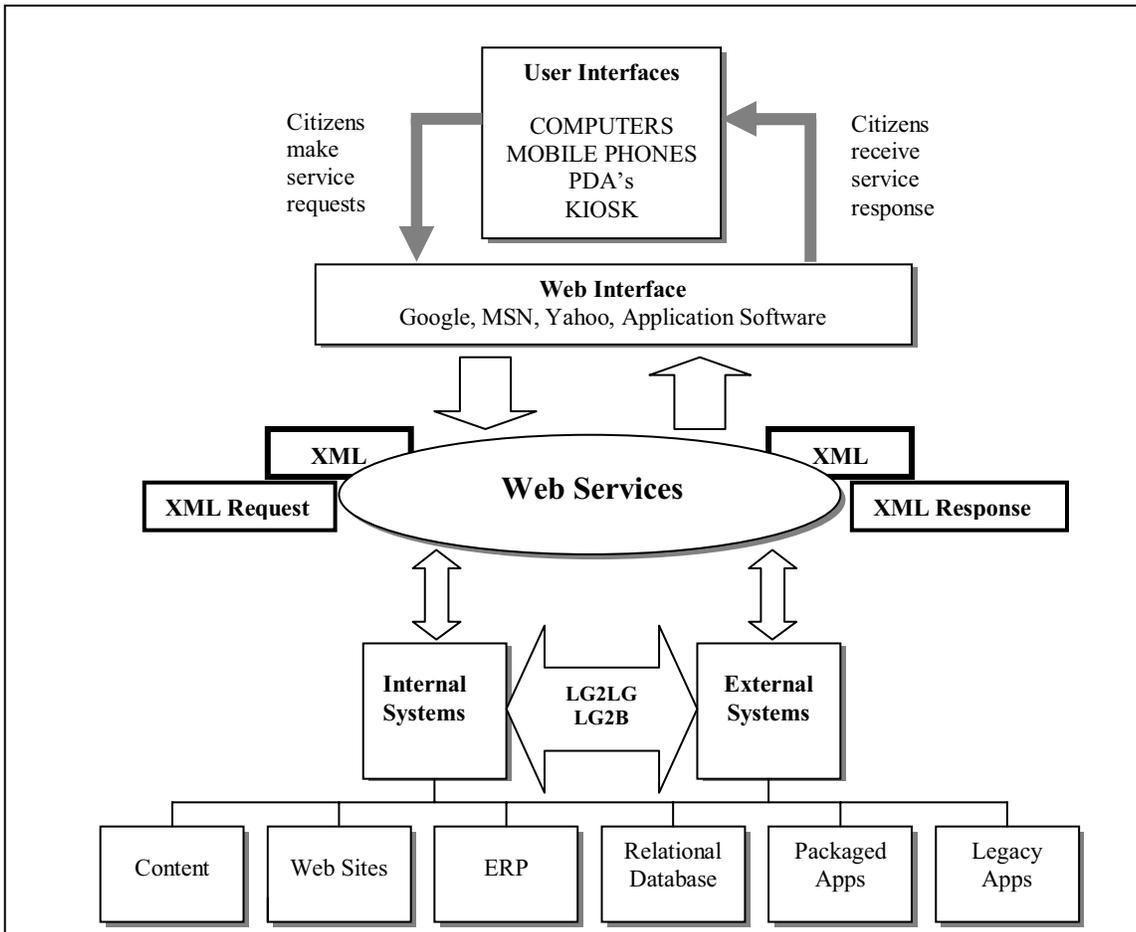


Figure 3: A Model for Integrating Government Processes and IT Systems Using Web Services