

A CONCEPTUAL LIFE EVENT FRAMEWORK FOR GOVERNMENT-TO-CITIZEN ELECTRONIC SERVICES PROVISION

Research-in-Progress

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Abstract

In recent years, life event approach has been widely used by governments all over the world for designing and providing web services to citizens through their e-government portals. Despite the wide usage of this approach, there is still a challenge of how to use this approach to design e-government portals in order to automatically provide personalised services to citizens. We propose a conceptual framework for e-government service provision based on life event approach and the use of citizen profile to capture the citizen needs, since the process of finding Web services from a government-to-citizen (G2C) system involves understanding the citizens' needs and demands, selecting the relevant services, and delivering services that matches the requirements. The proposed framework that incorporates the citizen profile is based on three components that complement each other, namely, anticipatory life events, non-anticipatory life events and recurring services.

Keywords: citizen profile, e-service provision, G2C, life event approach

Introduction

Governments, more than ever, are pushing information over the Internet, while citizens are increasingly seeking this information to interact with their governments so that they can make use of government services. Accordingly, how such information is provided by governments and how citizens are able to find it is a very important issue for achieving e-government objectives. To achieve this, a mechanism to effectively match citizens' information and service needs at the suitable points in their lives is necessary. This paper presents a conceptual framework for G2C service provision based on a life event (hereafter LE) approach and Citizen Profile (hereafter CP). It justifies why this approach should be considered as one of the promising delivery approaches of e-government services to citizens.

LE approaches have emerged as a metaphor to present electronic public services in relation to citizens' needs. A considerable amount of research has been conducted in recent years on the use of this approach for presenting, designing and building e-government portals (Bercic and Vintar 2003; Leben and Bohanec 2004; Momotko et al. 2007; Tambouris and Tarabanis 2008; Todorovski et al. 2006; Trochidis et al. 2006; Vintar et al. 2002; Vintar and Leben 2002). However, up to this point, the use of LE approaches has been limited to presenting and structuring public services and information rather than designing and building the whole e-government portal based on this approach and personalising these services to fit citizens' needs. There are, of course, alternative approaches for delivering e-government services to citizens but some of the techniques of LE approaches make it more suited to achieve high efficiency in e-government service provision. The fundamental research question of this paper is: how to develop a LE approach to provide personalised e-government services to citizens in an effective and efficient manner? By 'effective' we mean successful in meeting requirements of citizens; and 'efficient' refers to the optimal use of available resources to deliver the best services.

The purpose of this paper is to clarify generic concepts in LE approaches and to show how we can make LEs and CP work together in order to provide personalised services to citizens through active e-government portals. The remainder of the paper is structured as follows: the next section presents the significant growth of e-government Web pages for 10 countries since the year of 2005. Section III presents what is in the literature about LE approaches and portals to explain why a LE approach is needed and what difference it can make. Section IV introduces the CP concept for supporting a LE approach. Section V introduces a conceptual framework based on the LE approach and explains how it can be implemented. Section VI discusses briefly the proposed conceptual framework and provides some guidelines for designing and implementing an active portal based on the proposed framework.

The Growth of E-Government Web pages

Citizens are faced with an ever expanding quantity of online information and services provided by their governments, which makes the process of finding their desired information and services not as easy as it should be. In June 2005, Wagner et al. (2006) reviewed the government web pages of 10 countries (that are available through the Google search engine) to show that many governments have started to vastly increase the number of online interactions with citizens, and to provide a huge amount of information and services over the Internet. In Table 1 we reviewed the government web pages of the same countries (using the same search engine, Google) to see how many government web pages have been added to the Internet in nearly 6 years' time. We obtained the number of governmental web pages of each country by typing its government domain in the tool "Search within a site or domain" available in Google advanced search.

The results showed the huge increase in the number of government web pages that have been added to the Internet since 2005. However, e-government service provision is not about how much information and services are available online; it is rather how these services and information are being provided to citizens. Citizens should not be responsible for manually filtering out too much content they are not looking for (Wagner et al. 2006). E-government service provision models must be able to provide a way for citizens to access and find the information and services they need in an easy and convenient manner. This complements what (Wimmer and Tambouris 2002) defined as two of the most important prerequisites of

one-stop government: that public services must be integrated, and citizens must be able to access these services in a well-structured and well understandable manner in order to meet their perspectives and needs. It is not about building one-stop e-government system that helps the citizen to discover and use public services, it is rather how to make these services available to citizens.

| Table 1. E-Government Web pages Growth | | | |
|---|-------------------|---|---------------|
| Country | Government Domain | Number of Government Web pages on the Internet (through Google) | |
| | | June 2005 (Wagner et al., 2006) | February 2011 |
| USA | .gov | 368,000,000 | 905,000,000 |
| Canada | .gc.ca | 12,100,000 | 511,000,000 |
| UK | .gov.uk | 9,280,000 | 639,000,000 |
| Australia | .gov.au | 7,200,000 | 265,000,000 |
| China | .gov.cn | 2,630,000 | 381,000,000 |
| New Zealand | .govt.nz | 1,290,000 | 101,000,000 |
| Hong Kong | .gov.hk | 887,000 | 47,500,000 |
| South Africa | .gov.za | 816,000 | 5,030,000 |
| Thailand | .go.th | 728,000 | 232,000,000 |
| Slovenia | .gov.si | 388,000 | 18,100,000 |

Related Work

Life Event Approach

As mentioned earlier, e-government is not about how much information is online; it is rather about how this information is provided to users. A LE approach is an emergent approach of providing the e-government services and information to citizens by distributing the information and available electronic services (e-services) to the most important events of a citizen's life. It groups all the involved services that are needed to solve a particular problem faced when an event occurs by linking or/and integrating these relevant services in such a way that the citizens gain quick and convenient access to all what is required in one place; it is an approach that "integrates services, which are specifically designed around nodes that directly correspond to a particular life-event" (Leben et al. 2004). It may be structured according to specific characteristics regarding different citizen groups (e.g. birth, education, employment, marriage, family, retirement, death, etc.) (Leben et al. 2004). Wimmer (2002) argued that the LE approach has become a metaphor for structuring citizens' information and administrative processes in a user friendly manner; LEs describe situations where citizens may require government services. Portals that have been designed and built based on this approach are called LE portals (Vintar and Leben 2002). Making a distinction between LEs and what is so called life stages helps to simplify the definition of LEs.

According to Bogin and Smith (1996) life stages represent the development process of a human being from birth to death; this growth process can show the changes of personal and behavioural characteristics. They have categorised the human life stages into five stages: infant, child, juvenile, adolescent, and adult. Similarly, Boyer (2001) studied the evolution of childhood, the progression to adolescence and young adulthood, and the transition from adulthood to old age. Although there are different labels to life stages, they all represent the development process of a human being at different levels of granularity. These stages can help the LE approach by grouping LEs and services on the citizen life cycle according to their relation to that particular stage; in this case, citizen age is a determiner for choosing LEs and services to be included in a particular stage. However, due to complexity of defining life stages this paper does not consider life stages for designing citizen life cycles; rather, it uses LEs which reflect life stages.

The extraordinary growth in government information and services published and provided online raises a need for an efficient way to structure these government contents as well as an effective way to deliver them to citizens. LE approach satisfies this need by being citizen-centric oriented through providing these services based on real life events and situations in order to facilitate and enhance citizens' experience when accessing governmental information and services. LEs are defined as a way of describing situations of human beings that trigger public services (Kavadias and Tambouris 2003). More specifically, Marshall (1998) defined LEs as any major change in demographic, educational, health, employment or other individual circumstances that is locatable to a particular point in time, such as getting married/divorced, loss of job, graduating from school/university, death of spouse. A LE can be expected when it is planned, such as going to university (Marshall 1998). And it cannot be expected when it is unplanned, such as death of spouse. LEs can play a major role in selecting e-government services as they represent significant turning points in a citizen's life. Therefore, adopting a LE approach enables the service selection process to be more accurate at a particular time in a citizen's life. LE approach implies services through which the citizen finds all the necessary government services and/or information relating to a LE (Dias and Rafael 2007). What is interesting is that it can result from a single integrated request. Ontologically, The LE approach can model the categorisation of the e-government service and then map it to citizen situations where the service is applicable (Apostolou et al. 2011). A good example of a LE is "getting married": the citizen with a single request and, ideally, a single form, could update all relevant departments of his new marital status, get his new personal documents, or get any other relevant results.

Todorovski et al. (2006) proposed a framework for building generic models for LEs that cover all possible users' circumstances that can affect the resolution of the LE. They claim that LE models can be detailed at different levels. Therefore, they have identified four abstraction levels of LE models after analysing the existing approaches to building LE models. Their model consists of; identification level (where the LE can be described), specification level (where the involved public services can be described), interactive level (where the necessary processes and documents for performing public services related to the LE of interest can be identified), and the transaction level (where the necessary information for employees of the service provider "back-office" on how to perform individual public services can be provided). Meanwhile, Wimmer (2002) reported that structuring e-government portals according to LEs encountered semantic differences in the use of the terms processes, public services and LEs. These levels of abstraction can be used to overcome these semantic differences. Past research has investigated how LE approach can help governments to determine what services the citizens are after at a specific time of their life. California's LE and Affinity Design (L.E.A.D.) project brought together citizens and businesses to generate lists of government services that a citizen would need throughout a typical life span (Cook 2000). One of the groups that have participated in the research has generated a list for the 21-30 age range. This group needs and interests included events such as marriage, divorce, school systems, purchasing a house, name changes, and professional certificates. These interests can shape LEs for the e-government portal in California; however, they do not differentiate between expected and unexpected LEs. Furthermore, Sabucedo et al. (2010) discussed the use of semantic-base approach on LEs to reduce the complexity of service delivery as well as to improve the efficiency and reusability of e-government Web based information management systems by means of intelligent documents and LEs, they also proved that it can help to build up an intelligent platform to host e-government services.

Life Event Portals

In recent years there have been government efforts to improve the quality and efficiency of service delivery through their portals. E-government portals not only link but also integrate services of different government agencies into one access point that is accessible via the Internet. How to develop, structure, and design services in e-government portals is one of the key questions that should be answered in order to achieve the intended functionalities of such portals. Here too the LE concept has been introduced as a guiding approach for presenting and providing public services to citizens in an integrated manner via e-government portals (Trochidis et al. 2007). Business situations/episodes approach is a similar approach that has been introduced for government-to-businesses service provision (Trochidis et al. 2006). As

mentioned earlier, the portals that been designed and build based on LE approach are called LE portals, and there are two main types of LE portals.

The first type which helps citizens to identify their LE by organising the administrative areas and topics based on the defined concept is often called “passive LE portals” (Leben and Bohanec 2004; Todorovski et al. 2006; Vintar et al. 2002; Vintar and Leben 2002). After identifying the desired service by the user the portal will offer the selected service, which can be information, communication or transaction services. Leben and Bohanec (2004) claimed that the problem in such portals is that an individual LE offers services regardless of the actual problem of a user. It has been argued that the most of current e-government portals fit into this type of passive LE portals since these portals provide only standardised services that are not tailored to a particular user circumstance (Momotko et al. 2007). The E-Government Portal of Cyprus (www.cyprus.gov.cy) is a good example of such portals.

The second type of LE based portals is based on an active dialogue with the user. Therefore it is often called “active LE portals”. The concept of active portal has been widely discussed (Momotko et al. 2007; Tambouris and Tarabanis 2008; Todorovski et al. 2006; Vintar et al. 2002; Vintar and Leben 2002; Wimmer 2002). Such portals are based on a knowledge-based system (Leben and Bohanec 2004; Vintar and Leben 2002). The knowledge-based system in a LE portal employs the defined decisions in the structure of a LE to create a dialogue with users to define and solve their problems. Basically, knowledge-based system is a computer program based on inference mechanisms to solve a given problem by employing the relevant knowledge (Jackson 1999). The active portal aims to involve the user as an active partner in the overall process of identifying and solving their problem by guiding him/her through a particular LE (Vintar and Leben 2002). This will give the citizen the opportunity to be engaged more in the process of finding related services to meet his/her personal needs. Therefore, LE portals can offer much more efficient provision of e-services than the conventional e-portals (Vintar and Leben 2002). LE portals can be processed through an intermediation server that is capable of processing the citizen request and play an intermediate role between the citizen and the service provider.

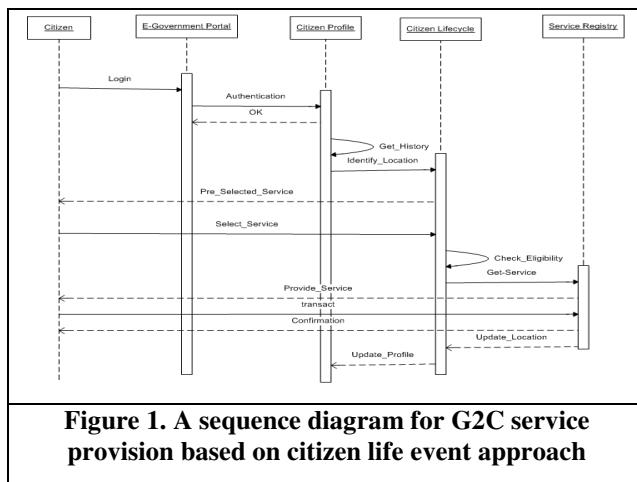
The practicality of building active e-government portals lies in the ability of interacting with the user in order to identify his/her circumstances, and based on these circumstances tailor the LE model to a personalised one matching the user's specific needs. Some argued that although LE portals have been widely used in practice and there are many public portals that are considered to be conceptually LE oriented, we are still at the very beginning of systematically studying, modelling and implementing the LE concepts and architectures (Momotko et al. 2007). Active LE portals offer public services with better corresponding system to user's desires than in the passive LE portal by interacting with the user to determine his/her actual needs. One of the key benefits of an active LE portal is the provision of services suitable to citizen's current needs on the basis of real citizen circumstances. According to Momotko et al. (2007) the challenge of building active LE portals is how to design such portals to (1) assure their flexibility, (2) enable easy integration with existing e-government infrastructures, (3) be compliant with laws and regulations, and (4) apply well defined SOA standards and existing components. Leben and Bohanec (2004) proposed a detailed architecture of an active LE portal; it draws on knowledge-based concepts and methods. The architecture consists of three main modules: logical, data and control. They operate on three levels: topic, LEs and services. The architecture presents the functionality and operation of the modules and proposes knowledge representation methods for the three levels.

Similar architecture for building an active LE portal has been proposed by Vintar and Leben (2002) with a more focus on the methodological aspects of the knowledge-based LE Portals. These two architectures propose a functional LE portal with a knowledge-based system as a core component. However, the citizen is responsible for choosing the relevant LE and responding to an online dialogue in order to select the services needed to solve his/her problem. Tambouris and Tarabanis (2008) presented a portal platform prototype for online one-stop government and demonstrated its use by employing the "getting married" LE. Basically the portal creates an online dialogue with the citizen in an automatic and dynamic way; therefore, they claim the portal is active as it enables the provision of personalised public services based on citizen circumstances; it employs workflow technologies to integrate public services provided by other public authorities into LE hence achieving a citizen-centric orientation. However, this online dialogue can be done without involving the citizen every time he/she requires a service; simply by storing the citizen information that the system may require. This can be done by incorporating a CP.

The Life Event Approach and the use of Citizen Profile

In a conventional e-government portal citizens at a particular LE (such as getting married, issuing a passport, registering a baby birth, etc.) should have a good understanding of what services/information to look for, how they can get them, their eligibility, etc. This can be problematic for citizens who may lack the ability to locate what is most relevant and useful to address that LE. Governments cannot assume that it is the citizen's responsibility to be aware of the internal structure of the government or all the sections of e-government portal in order to find the services they require as well as being aware of which services existed in the first place to fulfil their needs. The importance of having a CP in LE approaches lies in managing the citizen needs systemically, thereby enabling the system to tailor the e-government services based on the citizen needs. A CP contains information that can help the system to identify the citizen and his/her current status; it is a data structure that stores demographic data, interests, preferences, needs and previous behaviours of the citizen while accessing e-government services (De Meo et al. 2008). Furthermore, the use of CPs can improve the effectiveness as well as the accuracy of an e-government system by using this information to capture the citizen needs and monitor his/her behaviour. This will benefit the citizen, when the system recommends to him/her related services that they really need, and the government, when it is able to find the citizens who have the maximum benefit from the new service and/or be able to design new services that matches the citizen expectations.

CPs can help the system to suggest/recommend e-government services to the citizen or help him/her to find the right service at a specific LE. Furthermore, CP information can be used as an input to the service and/or to determine the citizen's eligibility for the service (Trochidis et al. 2007). Since the process of requesting a service of e-government portal should follow an order of activities; sequence diagram can be useful in helping us understand real-time specifications and describe both logical and physical interactions among the components of a G2C system. Figure 1 presents a sequence diagram for G2C service provision based on citizen life event approach which illustrates how the e-government portal can work with the notion of citizen life cycle (which contains LEs and services) and a CP (which contains information about the citizen).



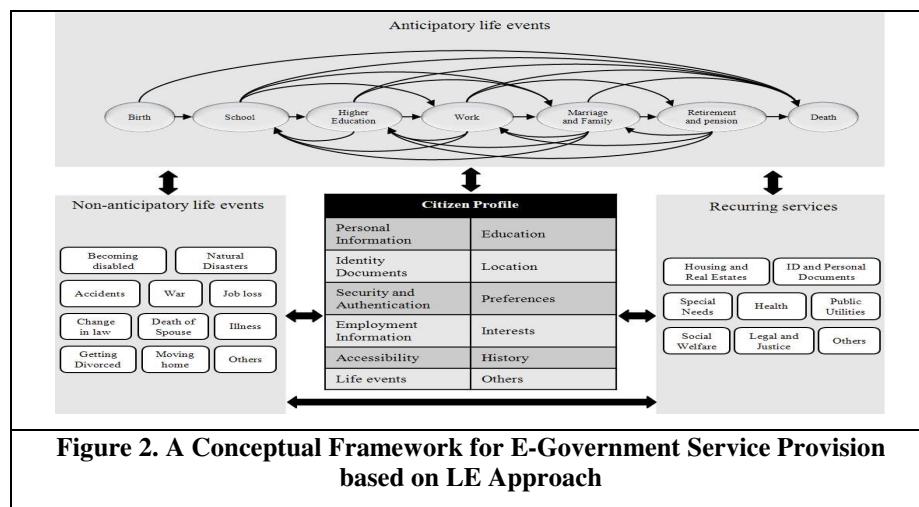
Several researchers have established information that can create a user or a CP (Gauch et al. 2007; Germanakos et al. 2008; Golemati et al. 2007). According to these, a CP may include personal information (name, date of birth, gender, marital status, contact information, religion, references, etc.), education (qualifications, educational degrees, spoken languages "first language", etc.), identity documents (ID card, driving license, passport, health insurance card, etc.), location (current address, place of birth, type of accommodation, etc.), preferences, security and authentication (national security number, portal user name, portal password, password hint, etc.), employment information (employed/unemployed, employer, date of employment, national insurance number, etc.), interests (sports, tourism, politics, etc.), accessibility (disabilities, connection, etc.), life events (occurred LEs, date of occurrence, etc.), and history (search history, services performed, etc.). Also for additional services,

information such as interests (sports, tourism, politics, etc.) can be stored. A CP can also store the past history of citizen's behaviour while searching, viewing, and performing the e-government services in order to help the system to identify the evolution of citizen needs. In such a manner, a CP can play a supportive role in government-to-citizen service provision.

A CP in a LE approach can help in addressing the citizen needs based on his/her circumstances that can be changed as a result of occurrence of a LE. For example, in a LE "loss of job", the circumstances of the citizen will face some changes based on him/her becoming unemployed, and these circumstances updates the CP with the new circumstances that imply the need for unemployment benefit. The needs require a service to address them; however, the unemployed citizen should be checked for his/her eligibility for that service, which can be checked through a CP that provides information as to whether he/she is eligible for that particular service. Finally, the circumstances as well as the performed services will be added to the CP to build up the history of that citizen

A Conceptual Framework Based on a Life Event Approach

LEs can be both predictable and unpredictable. A person can plan his/her future based on his/her needs, goals, abilities, desires, etc. Information provided by a CP can help in anticipating the citizen life cycle that will contain his/her major LEs in order to select services that matches these LEs and thus make it available when requested. LEs will trigger public services, for instance, the LE of "getting married" will trigger all the related services such as issuing a family book, changing the last name if applicable, changing the marital status in ID documents, etc. That means these services have the "getting married" LE as a precondition. In Figure 2 we illustrate a framework that explains how e-government services can be provided based on LE approach, by organising and distributing services into three groups, anticipatory LEs, non-anticipatory LEs and recurring services. The offered services in the three groups complement each other to select the optimum service for citizens based on their profile. The anticipatory LEs represent the citizen life cycle (from birth to death). It helps the system to find services that a citizen needs or might need during his/her life based on the information provided by the CP; the events in this layer represents the typical life cycle of a citizen (which may differ from a citizen to another), while the arrows represents most if not all the possible transitions to generate scenarios that might take place in this life cycle.



The non-anticipatory LEs contain services for LEs where the citizen faces an unexpected LE and he/she does not know what to do and/or what are the offered services for that particular event. The recurring services contain services where, in some cases, a single service might be needed regularly by the citizen as well as it might be needed in different LEs (since these services can be triggered by anticipatory and non-anticipatory LEs) and so it should be available all the time and in all those events.

The framework components, anticipatory LEs, non-anticipatory LEs and recurring services are integrated in order to make all the services available when required; and to complement their relation with the CP.

In other words, both non-anticipatory LEs and recurring service can be triggered by the anticipated citizen life cycle. Table 2 lists some examples of typical anticipatory and non-anticipatory LEs, which can be part of a citizen life cycle. Those LEs can contain a service or a group of services in order to be integrated and delivered as a package to solve a particular LE. As the citizen cannot perform all of his/her life events at the time of occurrence (e.g. birth, death) we believe that the citizen life cycle can overlap with a life cycle of a parent, spouse, children, and grandchildren. This overlapping will offer the possibility of performing e-government service on behalf of others if they are eligible to do so (whose life cycle is overlapped with him/her). For example, a child of 5 years old who is about to go to school will not be able to search and perform e-government services in this regard, so the parent will be eligible for doing such a service on his/her behalf once the system recognise the overlapping of their life cycles. A person's life cycle will overlap with his/her spouse's life cycle after they get married, a parent's life cycle will overlap with his/her children's life cycle after birth (or adoption). In case of death of a citizen, his/her spouse, parent, children (it can be determined only for the next of kin) will be recognised by the system, as an authorised person to issue a death certificate or perform any other services on his/her behalf.

| Table 2. Examples of typical life events | |
|---|--|
| Anticipatory | Non-anticipatory |
| Birth of Child | Death of Spouse (or a close family member) |
| Going to School | Getting divorced (relationship break-up) |
| Choosing a school/university | Job loss (unemployment) |
| Choosing a major to study | Illness |
| Issuing identity card | Moving home (changing address) |
| Graduating and earning a degree | Becoming disabled |
| Issuing a passport | Loss of ID card/passport (replacements) |
| Employment | Accidents |
| Buying a house | Natural Disasters (seeking help, volunteering) |
| Getting married | War (seeking help, volunteering) |
| Retirement | Change in law |

Discussion

A significant aspect of a successful and citizen-centric provision of e-government services is to represent the situational and context-sensitive services (Wimmer 2002). By adopting approaches that consider the situation in which the citizen requires a service or a group of services to help him/her overcomes any challenges in that particular situation. The LE approach can offer personalised e-government services by designing and integrating public services into LEs. Thus, the key is in defining and describing public services and LEs to trigger them when required. This can potentially lead to the question of how to implement a G2C systems based on LE approach. We address this question according to the proposed framework in Figure 2. In terms of the architecture design, there are two architecture designs that can be used to implement an e-government portal based on a LE approach; the first one is Service Oriented Architecture (SOA) that applies the concept of "one-stop-shop" service portals by offering a variety of services from different government agencies and promotes loose coupling between software components in order to be reused. The second one is Event Driven Architecture (EDA) that defines an approach for designing and implementing systems in which events transmit between decoupled software components and services (Marechaux 2006); SOA and EDA are two different design paradigms that aim to get the most out of the reuse of services that increase systems adaptability and efficiency in order to address complex integration challenges.

In terms of communication and integration there are different approaches that can be used to implement the proposed framework. Above all, Web Services technology (Newcomer 2002), i.e., SOAP over HTTP can be used as a channel between the framework components, and the use of UDDI can allow services as well as LEs to be automatically discovered. For instance, (Dias and Rafael 2007) proposed a generic model for one-stop e-government and a distributed architecture for its implementation. This architecture can support the implementation of LEs as well as single access points and integrated delivery channels since it is based on widely available technologies such as HTTP, SSL, XML and PKI. This research, like any other, has its share of limitations. As there is no guarantee that the proposed framework will overcome all the integration challenges since it has not been implemented or validated yet. Further research is required to integrate the framework components, to develop a mechanism for selecting the optimal service based on citizen circumstances and his/her profile information, and to develop further the notion of overlapping citizen life cycles, and to conduct an empirical study to validate the proposed framework and to check the effect of LE approach on G2C service provision.

Conclusion

The LE approach with the use of CP can provide integrated e-government services tailored to citizen needs at a certain time of life. The proposed conceptual framework reflects a first step towards designing a fully integrated government to citizens system for personalised e-government services provision. It creates a citizen life cycle by anticipating life events based on CP; this can play a major role in capturing the services of interests for the citizen. Non-anticipatory life events and recurring services can be triggered by anticipatory life events and vice versa. The notion of overlapping life cycles can play a significant role in identifying citizen responsibilities and eligibilities in terms of performing e-government services through active portals.

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