Towards a Life-event Oriented G2C E-Service Provision: the NoBLE Framework

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ABSTRACT

One of the primary features of modern government-to-citizen (G2C) service provision is the ability to offer a citizen-centric view of the e-government portal. Life-event approach is one of the most widely adopted paradigms supporting the idea of solving a complex event in a citizen's life through a single service provision. Several studies have used this approach to design e-government portals. However, they were limited in terms of use and scalability. There were no mechanisms that show how to specify a life-event for structuring public e-services, or how to systematically match life-events with these services taking into consideration the citizen needs. We introduce the **NO**rm-**B**ased **L**ife-**E**vent (NoBLE) framework for G2C e-service provision with a set of mechanisms as a guide for designing active life-event oriented e-government portals.

Keywords

Citizen-centric, e-government services, G2C, life-event approach, norms.

INTRODUCTION

In a conventional e-government portal, citizens at a particular life-event (such as getting married, issuing passport, registering 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 deal with that life-event. Governments cannot assume that it is the citizen's responsibility to be aware of their internal structure or all the sections within the portal in order to find services they require as well as being aware of which services existed in the first place to fulfil their needs. In this case of complexity, life-event approach becomes a promising solution by developing a deep understanding of when and why citizens require government services and what citizens want from government. Life-event approach with the use of citizen profile (hereafter CP) can provide personalised services tailored to citizen needs at a certain time of life. Despite the wide usage of this approach, there is still a challenge of how to use this approach to design e-government portals to automatically provide personalised services to citizens when they face a particular event. Leben and Bohanec (2003) have evaluated a number of life-event portals (portals designed based on life-events) and concluded that important aspects of design and development of life-events were neglected, such as helping to navigate through life-events, and coordinating of services within life-events.

It is not easy task for a citizen to navigate through a number of life-events if he/she is not aware of other existing life-events; and here the importance of defining types and categories of life-events arises. The other problem is coordinating services within life-events, as it is not efficient to link services with life-events in a hard-coded way (e.g. when adding a new life-event/service). Where it is possible to build a context-aware mechanism which matches life-events with relevant services; this can be done using the concept of norms from organisational semiotics (OS) discipline. Norms offer a viable alternative to govern e-government systems, which has not yet been fully exploited. In this paper we propose a Norm-Based Life-Event (NoBLE) framework with a set of mechanisms that can offer better provision of G2C e-service. First we provide a review of related work to life-event approach in e-government systems. An overview of key concepts in life-event approach and norms is presented and used to build the framework. Then we introduce and discuss the framework and its components, before we conclude with a summary and directions to future work.

RELATED WORK

Life-event approach has been widely used by governments all over the world for designing and providing e-services to citizens through their e-government portals. Although previous approaches have showed what life-event oriented e-government portals can offer to G2C e-service provision (Leben and Bohanec, 2004;Tambouris and Tarabanis, 2008); they are limited in terms of use as they have not described if/how life-events can be used to automatically trigger services of relevance. Another important limitation is that all these approaches have dealt with life-event as one type in terms of definition; however, life-events differ when it comes to defining different types of events.

Categorizing life-events or defining different types of life-events can help in capturing related services and satisfying citizen's needs based on their relevance to a particular problem. The process of finding e-services in a G2C system involves (1) understanding the citizens' needs and circumstances, (2) selecting the relevant services, and (3) delivering services that matches the requirements. To achieve this, some information has to be captured in order to understand the needs and circumstances of a citizen. This generates the need for citizen profiling that has been recognised in order to record the citizen context and personalise e-government services and/or information to match needs. According to Tazari et al. (2003) user profile consist of user's identity, characteristics, capabilities, preferences and the state of the user. The following subsections of related work will describe the concepts led to building the NoBLE framework.

LIFE-EVENTS TYPES

Citizens throughout their lives experience many different situations, both pleasant and unpleasant. Some situations are unique and citizens may not have had previous experience of them and will not know what to do in such situations. These events will affect them in one way or another, and consequently it will generate some needs that have to be satisfied in order to deal with these pleasant or unpleasant events. It is interesting to understand how life-events affect individuals, especially to have an explanation of age related needs and individual differences. As mentioned, life-events are different and thus they have different effects on individuals which make them generate different needs.

Currently most of the life-event approach adapters deal with all life-events as one type in spite of important factors such as time of occurrence, reason for occurrence, and possibility of occurrence. Chatterjee and Arora (2005) argued that life-events indicate to a significant change or require a significant change in the life patterns of an individual. Other researchers argued that a life-event involves a relatively unexpected change that may produce serious and long lasting effects (e.g. disability) (Settersten and Mayer, 1997). Thus, a life-event can simply indicate to a significant change or it may just occur as an unexpected change. These differences have led us to think about dividing life-events into types that best describe them when dealing with e-government services. Chatterjee and Arora (2005) have listed a number of types for life-events that have been classified in different ways within the psychology research (see Table 1). These dichotomous classifications of life-events which are useful in explaining the concepts of life-events research will determine the need for classifying life-events into different specific types in the context of our research when using life-event approach for G2C service provision.

Life-event Type	Description	Reference
Personal	the individual is a participant and partly or fully responsible for events	(Singh et al., 1983)
Impersonal	the individual is not directly responsible for events	
Desirable	the individual wants or has a desire for events	
Undesirable	the unwanted occurrence of events	
Pleasant	the individual enjoys such events	(Chatterjee and Arora, 2005)
Unpleasant	the individual experience noxious or dangerous events	
Major	the individual views the event as important and has value	(Kamaranjan, 1996)
Minor	the individual may neglect or not consider the event	
Severe	events where the individual experience a long or moderate term threat	(Brown and Harris, 1978)
Non-Severe	events where the individual experience a short term threat	
Chronic	stresses the individual with everyday living	(McGlashan and Hoffman, 2000)
Acute	stresses the individual in an unusual, unanticipated and undesired way	

Table 1 : Types of life-events (Based on: Chatterjee and Arora, 2005)

From the above table, we can see some similarities between the types, therefore it is possible to group these types together based on their definition; for instance (Personal, Desirable, Pleasant, Major, and Severe), (Undesirable, Unpleasant, and Acute), (Impersonal, Non-Severe, Chronic, and Minor). In the first group, it is possible to anticipate the possibility or even the occurrence time of a life-event; where in the second group it is not always possible to anticipate the possibility or the occurrence time of a life-event. The third group represent life-events that can affect individuals in the everyday living; therefore they can occur in a regular basis. This reflects the importance of the time of occurrence factor.

CATEGORIES OF LIFE-EVENTS

Having life-event categories is important as life-events should be grouped in sets to ease the process of understanding, recognising and differentiating life-events. Vintar and Leben (2002) proposed design architecture for active life-event portal which they argue that it has to have communication interface consisted of three hierarchical levels: (1) level of topics, (2) level of life-events, and (3) level of administrative procedures. The main concept of these hierarchical levels is to deal with life-events as a main topic under which it gathers all corresponding processes (Leben and Vintar, 2003). However, the citizen will still have to navigate through these main topics to locate specific life-event/service that he/she is looking for. In this case, life-event categories represent the level of topics; we add the concept of citizen lifecycle (hereafter CLC) to this level in order to facilitate the citizen mission of finding services. Figure 1 shows the hierarchy of service provision in NoBLE framework which will be further elaborated later, starting from CLC which contains a number of life-event categories, each category comprises of a number of life-events, down to the actual e-government services, where life-events are matched with relevant services through NoBLE matching mechanism.
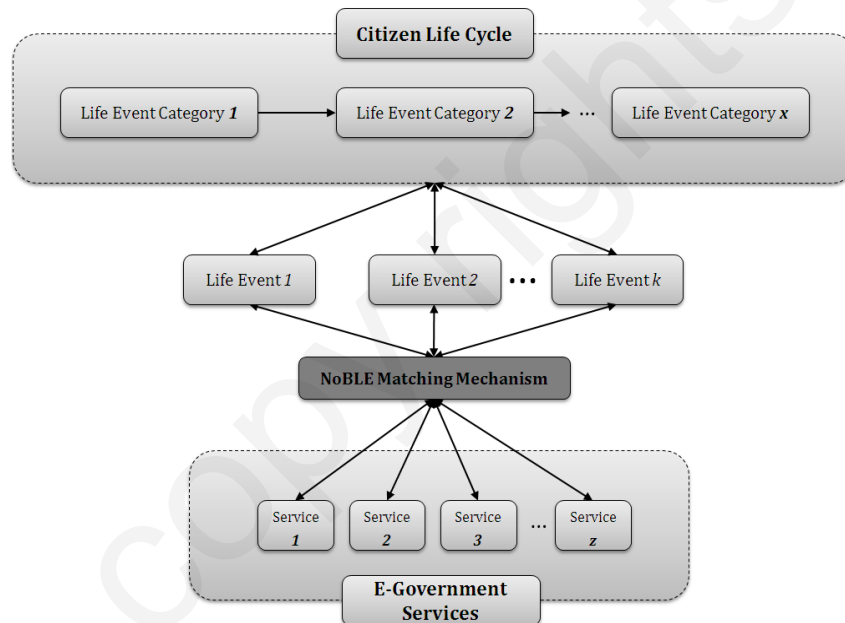

Figure 1: Hierarchical structure of NoBLE framework

THE CONCEPT OF HUMAN LIFECYCLE

Human lifecycle represents the development of a human through certain stages from birth to death (Bogin and Smith, 1996). Many countries adopt this concept in order to fulfil their objectives of providing citizen-centric services. For instance, in 2006, Cyprus launched a new e-government portal based on life-event approach, through which citizens can access several information and services from a single point of entry. The portal used the term "life-event cycle" for categorising the life-events of a citizen from birth to death. However, these life-events represent the lifecycle of the citizen not the life-event itself, Bhatnagar (2004) claimed that many successful portals are seen to be citizen-centric once they follow a navigation structure that closely mimics the lifecycle of citizens. The navigation should reflect the user specific needs, which citizen as a human require during each stage of life. Therefore it should be designed in a way that citizens (whenever they are working with the system) know: where are they at that moment and where to go next, how they can get there and how to get back, what they can do at that point and what alternatives are available.

NORMS

Organizational semiotics (OS) is a sub-discipline of semiotics that studies the problems of how information and human communication work in organizational contexts (Liu, 2000). Stamper et al. (1988) developed MEASUR (Methods for Eliciting, Analyzing and Specifying User's Requirements) comprising Problem Articulation Method (PAM), Semantic Analysis Method (SAM), and Norm Analysis Method (NAM). MEASUR offers a viable alternative to design e-government systems, which has not been fully exploited. OS considers both the technological and social aspects of information resources, and analyzes them as main components of information systems. In this paper, we focus on NAM as the key method that can analyse and identify agent's responsibility and norms that control this agent's behaviour. The semiotics approach changes the conventional view of organizational structure into the functional view organizations based on norms; this is known as organizational morphology, which consists of three types of norms: substantive (concerned with governing the essential tasks of the organization), communication (also known as message passing, concerned with informing relevant people about relevant work procedures, what actions to be taken, when and by whom) and control (concerned with monitoring organization performance) (Liu, 2000).

Norms are the rules which determine how social organisms interact and control relationships (Liu, 2000; Stamper, 1985). Norms are developed through practical experiences of agents in a society, and in turn have functions of directing, coordinating and controlling actions within the society; they can be represented in all kinds of signs, whether in documents, oral communication or behaviour. They include explicit stated rules and regulations (officially documented norms), e.g., a citizen cannot vote in general election unless he/she is 18 years old, and unstated implicit social rules by which all the members of the social groups interact.

A LIFE-EVENT FRAMEWORK FOR G2C SERVICE PROVISION

Life-events can be both predictable and unpredictable, and citizens may plan their future based on their needs, goals, abilities, desires, etc; or they may not have the chance to do so. In Figure 2 we introduce the NoBLE framework which aims to build a generic life-event model that considers all possible citizen specific needs that can influence the determination of a life-event. The framework consist of six main components; (1) life-events types (anticipatory, non-anticipatory and recurring), (2) norms registry (contains a set of defined norms to match life-events with related services and organise different life-events in types), (3) service registry (where services are registered using the proposed service registration schema), (4) life-events registry (where life-events are specified using the proposed life-event specification schema), (5) CP (where a collection of personal data associated to a specific citizen can be created using the proposed user profile schema), and (6) NoBLE matching mechanism (where the defined norms are used to match life-events with relevant services).
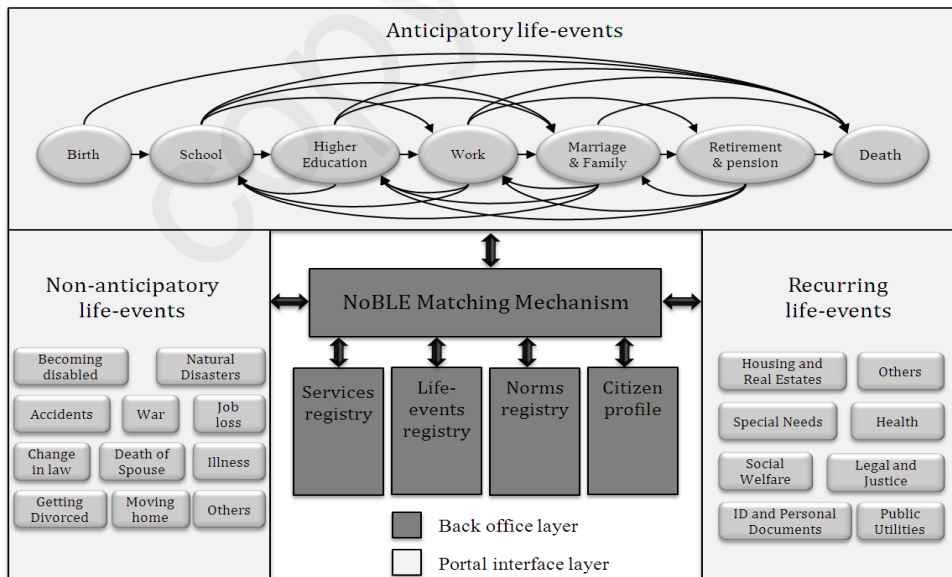

Figure 2: The NoBLE framework (Adopted from: AlSoud and Nakata, 2011)

The framework has two layers; the portal interface layer where the citizen can interact with the portal, and the back office layer where the NoBLE components work together to select the life-events/services based on the citizen needs using the norms and the CP (if existed). However, this framework has three methodological challenges in terms of implementation: specification of life-events, identification of service and matching life-events with relevant services; this will be further

elaborated later. In NoBLE matching mechanism, life-events will trigger public services using norms (e.g. the life-event of "getting married" will trigger all the related services such as registering marriage, issuing a marriage certificate, changing the last name if applicable, changing the marital status in ID documents, etc). NoBLE framework divides life-events into three types based on their time and possibility of occurrence, namely; anticipatory, non-anticipatory and recurring life-events.

Anticipatory represent events that have a high possibility of occurrence and it is possible to anticipate its time of occurrence (e.g. birth of child, getting married, etc.). Non-anticipatory represent events where we cannot anticipate their time of occurrence or if they will occur at all (e.g. death of spouse, becoming disabled, etc.); while, recurring represent events that may occur more than once (e.g. voting, staying healthy, etc.). One of the significant aspects of having non-anticipatory life-events is to provide immediate services that might be needed whenever an unexpected life-event occurred. For example, in natural disasters the portal would be able to support the provision of urgent assistance during emergencies caused by life-events such as floods, earthquakes or storms as well as monitoring circumstances to anticipate the likelihood and effects of such events. This iterate the importance of having a CP, as government would be able to provide the needed services in such circumstances and contact citizens who might be affected based on their location.

NoBLE framework categorise life-events into different categorise to arrange them based on their relevance to the life-events listed under them. This will limit the number of life-events (options) that the citizen should be aware of in order to locate the desired life-event or service. The life-event category will illuminate the relationship it has with its related life-events and services. Many countries that have adapted life-event approach have different names of life-events but they commonly distribute these life-events on stages of the citizen's life. And based on that NoBLE has seven life-event categories, namely: (1) birth, (2) school, (3) higher education, (4) work, (5) marriage and family, (6) retirement and pension, and (7) death. These categories represent the anticipatory life-events and their order shapes the CLC. Each category was chosen to semantically represent the life-events/services it provides; non-anticipatory and recurring life-events can also be categorised into groups of their related life-events such as: natural disasters and health, respectively.

Component	Description	Example
Citizen Lifecycle (CLC)	A lifecycle comprises typical life stages of a citizen's life where life-events are distributed to categories	Birth > *School* > Higher Education > Work > Marriage and Family > Retirement and Pension > Death
Life-event Category	It comprises a set of life-events, services and information related to this category	*School*
Life-event	It comprises a set of services and information about a particular event in a citizen's life	*Going to School* Changing School Leaving/Graduating from School
Services	It refers to the e-government service whether they are informational or transactional	*Search for schools; Apply for school; Register in school; Apply for pre-school vaccinations; etc.*

Table 2: Example for "going to school" life-event using NoBLE framework

Citizens may need a number of unrelated services to complete what they view as a single problem. This is illustrated in Table 2, where a citizen wants to send his/her child to school. From a citizen perspective, it is a one matter; however, it contains a number of different services provided by different government ministries (in this case, the service of apply for a school might be provided by Ministry of Education and the service of apply for pre-school vaccination might be provided by Ministry of Health). Hence, in some cases a citizen has to request different services from different government agencies when solving one particular problem faced at a particular time of life.

FRAMEWORK COMPONENTS

We define the six major components of NoBLE framework by describing; (1) how do we create CP and what information do we need and why, (2) how do we specify and register new life-events, (3) how do we register e-services, (4) how do we match life-events with services, and (5) how do we define the eligible users in cases where citizens are incapable to perform his/her own services. The following subsections describe these components and their operation.

Citizen Profile Schema

Several researchers have established information that can create a user profile which is vital to personalise e-government services. Table 3 presents the information needed to create a CP; this information will help in (1) anticipating life-events occurrence, (2) identify relevant services, and (3) personalise these services. However, it is important to answer the question

of how much privacy would citizens be willing to loose in order to get personalised e-government services? It is important to determine what information the system needs, when and why? The citizen should have the right to choose which information of his/her profile to be accessible by government administrators and which information not to be. Each CP should be uniquely identified by an ID (Yu et al., 2004); this is especially useful for linking the overlapped CLCs.

Profile Category	Profile Sub-category	Reference
Profile ID	Number	(Yu et al., 2004)
Authentication	User name, Password	(ALSoud and Nakata, 2011)
Personal Information	Full name, Gender, Marital status, National number, Date and place of birth, Spoken languages	(Golemati et al., 2007); (Schuurmans et al., 2004); (Tazari et al., 2003)
	Religion	(Schuurmans et al., 2004)
Qualifications	Academic, Vocational, Skills	(Golemati et al., 2007); (Schuurmans et al., 2004); (Tazari et al., 2003)
Contact Information	Home number, Office number, Mobile number, E-mail address, Post address	(Schuurmans et al., 2004)
Identity Documents	National ID card, Passport	(Schuurmans et al., 2004)
	Car license	(Golemati et al., 2007)
Location	Home Address, Type of Accommodation, Work address	(Schuurmans et al., 2004)
Ownership	Houses, Land, Vehicles, Pets	(Golemati et al., 2007)
Overlapped lifecycles	Profile ID, Relationship	(ALSoud and Nakata, 2011)
Portal History	Visited Life-events, Performed Services	

Table 3: Citizen Profile Schema

Specifying Life-events

The process of specifying a new life-event requires identifying some attributes for the new event to describe it and allow the system to link it to other life-events (if applicable) and to trigger relevant services. Table 4 presents a life-event specification schema which shows what information has to be specified when registering a new life-event. A new specified anticipatory life-event can be added to the CLC using an automatically generated life-event ID to link it where it fits in the whole lifecycle.

Element	Sample	Description
ID	5113	A unique number for this life-event
Name	Getting married	Life-event name
Category	Marriage and Family	The category this life-event belongs to on CLC
Type	Anticipatory	Anticipatory or non-anticipatory
Description	This "page" gathers together some of the information you may need for your wedding	Information for the citizen about this life-event
Information	Published on 01-02-2012 by Civil Status Department	Information about the life-event, when it is published and by whom
Possible Pre-life-events	Becoming 18	Identify the related life-events that need to be or might occurred before this life-event
Possible Post-life-events	Having a baby; getting divorced; death of spouse; pregnancy	Identify the related life-events that need to be/might occurred after this life-event
Responsible users	Citizen	Identify who is responsible for performing this

		life-event and who is eligible to do so

Table 4: Life-event specification schema

Registering Services

Public services are usually provided by different public administrations (ministries, departments and agencies), and as many countries have adapted e-government programs in a short period of time, most of them started to automate their services in a decentralised way. That means there was no standardisation or consistency in registering their services online. We develop a schema (see Table 5) for registering e-government services to suit our framework which is built based on life-event approach. The schema contains basic information about the service and its attributes, and the life-event categories that this service belongs to, and the type of these life-events categories as this will facilitate the process of discovering the service when triggered by a life-event.

Element		Description
ID		Service ID
Name		Service name on the system
Life-event category		Birth, school… Death
Life-event type		Anticipatory, non-anticipatory or recurring
Description		For developers
Service attributes	Availability	When it is available
	Eligibility	Like responsibility, age, location,
	Type	Informational, transactional, interactive
	Display name	Name appears to user
	Description	That appears to user
	URL	Service link address
	Prerequisites	Prior conditions for the service
	Version	Date of publication
	Transaction fee	Service cost
	Provider	Who is providing the service

Table 5: E-service registration schema

Matching Life-events with Services

In order to resolve a life-event, citizens need to perform one or more public services; however, these e-services need to be identified within that life-event. And this is the most important step in the process of providing public services through life-events, where a matching mechanism is needed to match the specified life-events with the available and related e-services. As mentioned earlier, we use norms to specify what users (citizens and government administrators) must, must not and may do. These are equivalent to three deontic operators in NAM, permitted, obliged and prohibited. Norms reflect regularities in the behaviour of system agents, allowing them to coordinate their actions (Stamper et al., 2000). A norm subscribes to the following construct:

Whenever <condition> **if** <state> **then** <agent> **is** <permitted/prohibited/obliged> **to** <action>

This norm format captures the necessary elements of norm specification for our purpose. One of its significant benefits, that it can keep their semantic meaning when moving to the physical layer of any IT system. Therefore, an analyst can define the social norms that govern the patterns of behaviour of an agent who can be a citizen, an eligible user (who can be determined by the overlapped lifecycle), a government administrator or the system itself.

Norm Construct	Whenever	If	Then	Is	To
Matching a life-event with a service	Life-event	Conditions	Agent	Permitted/ Obliged/ Prohibited	Service

Examples	A citizen is going to school	Child is younger than 4 years old	Parent/ Guardian	Prohibited	Register the child in school
	A citizen is getting married	Citizen or his/her partner is minor	Citizen	Obliged	Submit a parental consent form
	A citizen is getting married	Citizen and his/her partner has registered their marriage	Citizen	Permitted	Issue a marriage certificate

Table 6: Matching life-events with services using norms

Whenever a condition is met, the agent will adopt a certain position towards some consequence, which reflects the agent's state towards this consequence and since agents are social objects, the mental structure of each of them will be anticipated and predicted by others (Stamper et al., 2000). Table 6 shows how life-events can be matched with services using the construct of the norm, as the condition of "Whenever" will be met on the occurrence of the life-event itself and then the service prerequisite in the "if" part of the norm construct will identify the responsible agent in the "then" part, and then the deontic operator after "Is" will determine what action to be made in the "To" part of the norm construct which is the service itself.

OVERLAPPED LIFECYCLES

As the citizen cannot perform all of his/her life-events at the time of occurrence (e.g. birth, death) we believe that the CLC should overlap with a lifecycle of a parent, spouse, child, guardian (a person who has the legal authority to care for interests of another person who usually is incapable of caring for his/her own interests due to infancy, incapacity, or disability), etc. This overlapping will offer the possibility of performing e-government service on behalf of others (see Figure 3) if they are eligible (if their lifecycles are overlapped), this will also play a role in defining the responsibility of some system users. 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 parents will be eligible for doing it on his/her behalf once the system recognise the overlapping of their lifecycles. A person's lifecycle will overlap with his/her spouse's lifecycle after they get married, a parent's lifecycle will overlap with his/her children's lifecycle after birth (or adoption) and so on. A mechanism to link the overlapped CLC should be defined in order to determine the eligible citizens and provide them with the service they might request on others behalf.
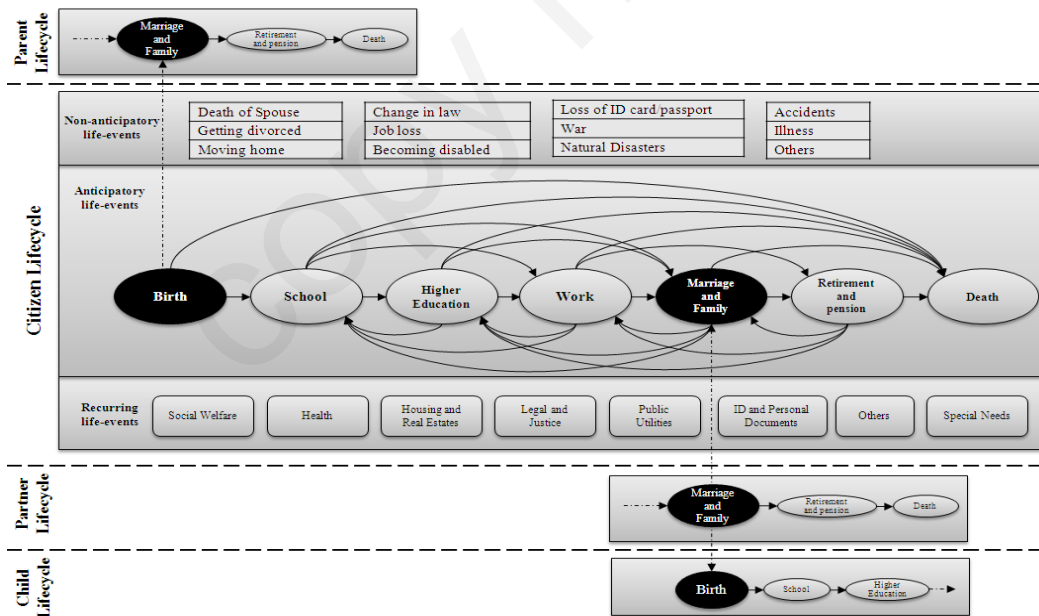

Figure 3: Overlapping citizens' lifecycles

Linking CLCs is important to define citizen's responsibility in some cases where other citizens are incapable of requesting or performing public services based on their own needs. For example, a citizen needs to issue a death certificate for his dead father. The linkage of the overlapped lifecycles can be identified in citizen's profiles where the citizen can have the right to restrict some of the eligible persons from performing services on his/her behalf, and norms will identify the responsibility of each agent within the system.

CONCLUSION

Life-event approach has proved success in providing more citizen-centric e-government services to citizens in the last few years, by providing services structured around events in citizen's life. Based on this approach, we have proposed the NOrm-Based Life-Event (NoBLE) framework for providing personalised e-government services to citizens using norms and citizen profiles, we introduced and described the framework components and their schemas. Although the framework has not been implemented yet, it provides a set of guidelines for designing an active life-event portal for G2C e-service provision. The future work will be evaluating the framework and then implementing the framework by designing an e-government system that provides e-services based on the framework principles.

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