CITIZEN-SIDE HANDLING OF LIFE EVENT SERVICES

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Keywords: E-government, Life Events, Privacy, Public Administration, Electronic Service Delivery.

Abstract: CHAPAS is a model for the provision of life event e-government services where no direct communication between service providers exists. The citizen, assisted by a personal tool (Chappie), is responsible to gather all the information required by the service he wants to apply to, possibly from services of other providers. In this paper we discuss how life event e-government services are provided in CHAPAS, from the point of view of the interactions of Chappie with services. The immediate advantage of this approach is that services do not need to directly interact with each other to provide complex life event services, thereby citizens having full control of the flow of their personal information.

1 INTRODUCTION

Life event e-government services are e-government services organized according to episodes in everyone's life (Vintar et al., 2002). Examples are the birth of a child, the purchase of a car, etc. Typically, life event situations require the citizen to interact with several public services, possibly from several Public Administration (PA) departments. Life events should not require the citizen to understand the PA complexity in order to determine the partial services required to satisfy their life event situation (application sequence, the information each requires and produces, etc.) (Dias and Rafael, 2007).

A common approach to life event service provision is the integration of several partial services into a single service to be offered to the citizen. Implementations of this integration, illustrated in Figure 1, basis on direct communication between PA departments and on the coordination of the life-event service by some department (Pappa and Makropoulos, 2004; Vintar et al., 2002; Dias, 2011). While this approach brings real benefits for the citizen by reducing service complexity, e.g. by requiring less citizen information, it also implies the citizen loss of control over the flow of information between PA departments, which may raise privacy concerns.

Our approach to e-government life event service provision (Gomes et al., 2011) has the potential to improve citizen privacy by making the citizen aware of whom and when, accesses his information. This is achieved by allowing the citizen to control the execution of life event services and the flow of information between participating services, as illustrated in Figure 2. This way, we avoid the need of direct communication between PA departments, for the purpose of service provision, at the cost of bringing service complexity back to the citizen side.

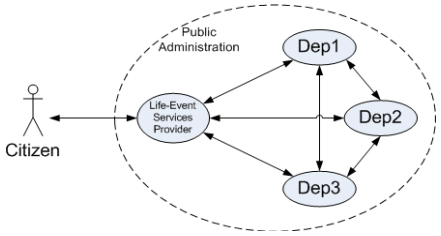

Figure 1: Common model of life-event service provision to citizens.

Our model, CHAPAS, can only be effective if complexity is handled transparently by the citizen, while under his control. This calls for a new way of making e-government services publicly available and a tool, running on the citizen computer, to assist the citizen in his interactions with services and providing some level of automation while preserving citizen control of information flow. This tool is Chappie (formerly egWallet (Gomes et al., 2011)).

The goal of this paper is to discuss the provision

Gomes H., Zúquete A. and Paiva Dias G..
CITIZEN-SIDE HANDLING OF LIFE EVENT SERVICES.
DOI: 10.5220/0003936805650570
In *Proceedings of the 8th International Conference on Web Information Systems and Technologies* (WEBIST-2012), pages 565-570
ISBN: 978-989-8565-08-2

of life event services in CHAPAS from the point of view of the interactions with services. We present the related work in section 2 and an overview of CHAPAS in section 3. In section 4 we discuss how life event services are implemented and in section 5 we present details of how a service express which documents it requires from citizens. In section 6 we discuss some advantages and disadvantages of CHAPAS after which we present the conclusions.

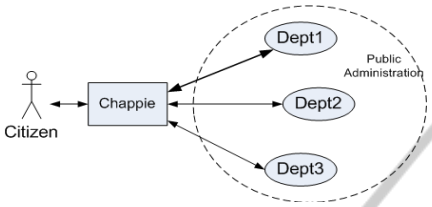

Figure 2: CHAPAS model for life-event service provision.

2 RELATED WORK

The offer of life event services typically implies the integration of services from multiple independent PA departments. This integration involves direct communication between PA departments (Tambouris et al., 2008). An approach for this integration is modelling life event services as workflows of existing services (Momotko et al., 2007; Momotko et al., 2006; Oteniya et al., 2006; Todorovski et al., 2007). Life event services are then offered in active life event portals (Vintar and Leben, 2002; Vintar et al., 2002; Todorovski et al., 2006; Momotko et al., 2007; Tambouris and Tarabanis, 2008). OneStopGov (http://islab.uom.gr/onestopgov) and eGov (http://www.egov-project.org) are examples of such portals. They simplify citizens' interaction with services, but the citizen is not in control of the life event service (it is managed by some government agency) and does not control the dissemination of his information through the involved PAs.

In (Dais et al., 2008) an integration platform is proposed that gives the citizen full control over the data kept in the platform and allows him to personalize his interactions with PA services. The citizen is even able to orchestrate personalized life-event services, being the platform the central point of communication between all involved services. However, the platform is controlled by a "commonly accepted and independent authority, constitutionally and legislatively responsible for the protection of citizens' personal data" and not by the citizen. A further enhancement to include Web2.0 interactions is presented in (Dais et al., 2011).

In (Todorovski et al., 2007) it is defined a general life event reference model that abstracts the generic characteristics of life event service workflows and classifies partial services in three types: (i) support services, (ii) crucial services and (iii) after-care services. Support services provide the information required by crucial services. Crucial services are those services that are always executed, independent of the citizen circumstances. After-care services are complementary services to which the citizen may apply after life event service completion as, for example, applying to a change maiden name service after a wedding service. This classification of partial services that compose life event service workflows will be useful in our approach to the provision of life event services.

3 OVERVIEW OF CHAPAS

At the basis of CHAPAS model is the premise that no direct communication between PA departments is needed for the provision of services to citizens (Gomes et al., 2011). As a result, it is a citizen responsibility the gathering of all the information required to apply for the service he is in need. We consider that this information is in the form of documents gathered from provider organizations. Other ways of providing information, like citizen form based input information, are not considered at this stage. Nevertheless, they should be handled similarly if documents can be used as a base to implement them.

A **document** is an identifiable self-describing item of information in a XML format according to a XML schema. The schema is typically defined by the respective document issuing organization, or by some standard organization and adapted by the document issuer organization.

Documents are composed of **attributes**. An attribute is an identifiable item of information inside the document and corresponds to an element of the document schema. Attributes are used to identify items of information inside documents that for some reason have to be dealt in a special way as, for example, an attribute value that mandatorily must be present in the document (e.g. owner name). Attributes may correspond both to simple and complex schema elements.

To facilitate the citizen gathering of the documents required by a service, Service Providers must provide some guidance. Such guidance is the **Required Documents Policy** (RDP), that specifies the documents a service requires and from where

they may be obtained. The RDP must be publicly available and in a format that computers can process.

Notice that Chappie is agnostic regarding the meaning of the information it handles. Chappie role is to gather documents from issuer services, following their RDP, and provide them to consumer services, also following their RDP, all under citizen agreement. To fulfil this role, it has no need to take decisions based on the meaning of the information in the documents; it just follows the guidance in services' RDPs, always under citizen supervision.

Discovery of life event services is not in the scope of CHAPAS. We consider that the citizen discovers the life event service he needs, for example, by browsing in some life event portal. When the citizen selects (clicks) the desired life event service, the browser activates Chappie which will handle the life event service.

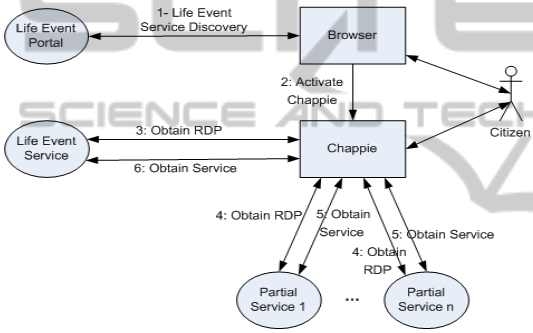

Figure 3: Interactions with services in CHAPAS.

An important pattern in CHAPAS, illustrated by Figure 3, is the recursive dependency satisfaction pattern of Chappie interaction with services. It comprises four steps:

i. Obtaining the RDP;
ii. Gathering all required documents, from the respective providers;
iii. Applying for the service (includes providing all the required documents); and
iv. Obtaining the resulting documents at service completion.

It applies to every service and is a key to understand how life event services are provided in CHAPAS.

4 LIFE EVENT SERVICES IN CHAPAS

A life event service workflow describes the progression of steps (actions to execute, partial services), from the start to the conclusion, that results in the satisfaction of the life event service. The progression may have branches, created by forks, when some steps may perform in parallel, and by decisions, when the selection of the next steps depends on some condition, as citizen circumstances like age, civil status, etc. The workflow is managed by an organization and some of the workflow steps may involve the execution of services (partial services) possibly provided by other organizations.

Modelling life event services as workflows of partial services is not well suited for CHAPAS. One reason for such is the CHAPAS base principle of avoiding direct communication between service providers. In the workflow model, at least the life-event service provider has to communicate with partial service providers. Other reason is that the workflow paradigm (a known progression of steps from start to end) does not fit with the Chappie dependency satisfaction pattern, where a service provider specify which other services must be previously executed to obtain the documents required by the service the citizen is in need.

The partial service classification from the general life event reference model (Todorovski et al., 2007) is useful to our modelling approach to life event services. It identifies Crucial Services as a type of partial services that always execute in life event service workflows. If we do not consider after-care services (a type of service not always considered in the modelling of life event services (Todorovski et al., 2007)), the last partial service executed in life event services workflows is always a crucial service. This makes crucial services good entry points for the execution of life event services in CHAPAS, i.e., the service to which the citizen first applies. The execution of the life event service will then evolve by recursively applying the dependency satisfaction pattern to the entry-point service and to all partial services that must be contacted to obtain the documents required by the entry-point service.

The recursive dependency satisfaction pattern implies that Chappie, based on the RDPs collected from each partial service, builds a dependency graph of partial services, illustrated in Figure 4, starting from the entry-point service. Its execution satisfies the life event service.

Typically, the set of documents required by a service depends on a set of circumstances as, for example, the citizen age (minor, senior, etc.), civil status (single, married, etc.), etc. Therefore, a service RDP must include circumstance-based decision rules to evaluate which documents a specific citizen must provide. Since documents are obtained from partial services, circumstances implicitly also determine to which other services the citizen must apply to obtain

the required documents.

It is important to notice that an RDP refers to a single service. No single service has a global view of all partial services involved in a life event service, as it occurs with workflows. Only Chappie, after building the dependency graph, has this global view, but tailored to a specific citizen. This dependency graph is equivalent to the corresponding life event service workflow pruned of all branches that do not apply to the specific citizen circumstances.

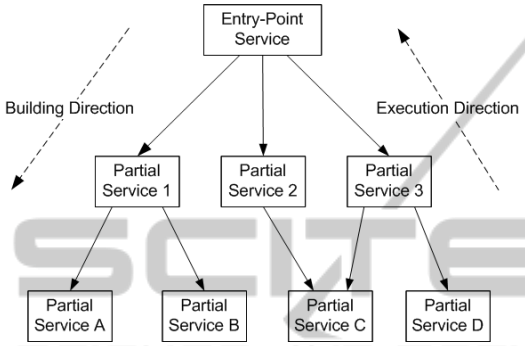

Figure 4: Life event service dependency graph example showing its building direction and its execution direction.

5 REQUIRED DOCUMENTS POLICY

The RDP is a statement describing the requirements of a service. Generically, it specifies (i) the documents the citizen must present, including the required attributes on each document and the services from where each document may be obtained, (ii) the circumstances affecting which documents the service may require, and (iii) the circumstance-based decision rules whose evaluation determine, for a specific citizen, the documents to be present. Each of these sections of the RDP is further analysed in the next sections.

5.1 Documents

The Documents section specifies the documents required by the service providing the RDP. For each document it must identify the its type, the attributes requiring special actions, and the issuing services.

The document type specifies a unique identifier for the type of the document (e.g. a birth certificate) and the schema to which the document must comply.

Document attributes that must be subject to some special action by the document issuer (e.g. to omit or encrypt their values), may be specified. The specification must identify the respective item of information in the document and the special action to be applied. The specification of an attribute action depends on the specific action. For example, if ciphering is required then, along with the action identifier, an encryption algorithm and a key must be specified. If the special action is to omit the attribute value, only the action identifier must be specified.

A document specification may contain the specification of the services that are able to issue the document. Two possibilities might occur: at least one very well known issuer exists, in which case it must be precisely identified with the contact point from where to obtain the respective RDP, or only the types of providers, e.g. municipalities, insurance companies, etc., are known. In this latter case, a list of types of providers is specified. Both types of provider definitions may coexist and it's a citizen responsibility to indicate the specific provider from where the document must be gathered. Directories of services may be used, in the latter case, to assist the citizen in the selection of the service to be contacted. This directory search is not addressed in this paper.

5.2 Circumstances

In the Circumstances section the circumstances that influence which required documents a citizen must present when applying for the service are specified.

We consider two types of circumstances: those whose values are given by the citizen and those that correspond to attributes in documents. In the first case, since Chappie is agnostic to the meaning of the circumstances, the RDP must include a text question and a value data type in order to handle the interface with citizen to get the circumstance value.

The latter case requires accessing a document and read the attribute with the circumstance value. The document must be defined in the Documents section of the RDP. This latter case may also require the previous gathering of the document from its respective service provider.

5.3 Decision Rules

Decision rules are Boolean expressions that specify the dependency of the required input documents on a set of circumstances. Each required document must be clearly associated with a Boolean expression. Chappie must evaluate them to determine which documents a specific citizen is required to present, i.e., which documents must be gathered.

To evaluate a Boolean expression, Chappie must obtain the circumstances' values. As values are obtained directly from the citizen or from attributes

in documents, which might have to be first gathered from the respective service providers, evaluation rules were defined to avoid the risk of both bothering the citizen with questions not applying to its specific situation or the request of unnecessary documents. Also a XML language was defined to express the decision rules.

6 DISCUSSION

In previous sections we briefly presented CHAPAS and how it implements life event services. It is based on a mechanism where service providers define the documents each service requires and a citizen tool (Chappie) that agnostically and recursively gathers and provides those required documents from and to services respectively, in order to fulfil the life event service the citizen is in need. Since it runs on a citizen computer, the citizen is in control of the disclosure of his information. This is a clear benefit for the citizen as it promotes his privacy.

CHAPAS also brings benefits for organizations as the costs of e-government interoperability may be reduced. Interoperability projects are very complex and very risky. Three levels of interoperability have been defined: technical, semantic and organizational interoperability (IDABC, 2004). The organizational level is the harder to achieve, as it involves political and hierarchical issues. In CHAPAS organizational interoperability is simplified as no dramatic changes are required on organizations internal processes: they keep interacting with Chappie as they used to do with individual citizens and avoiding the need to cooperate with other service providers in the development of transversal workflows. Only technical and semantic interoperability is required, but they are required in any interoperability project.

There are some issues that complicate life event service provision in CHAPAS, which we discuss now. One is services' asynchrony. While there are services that immediately execute and complete, producing their intended outputs, other exists that may take long, and irregular, time intervals to complete. One reason for this is the human decisions in the service execution loop. Since services' outputs are not produced immediately at service request and the requesters are not willing to wait large amounts of time for the service completion, Chappie must handle asynchronous services.

The failure of service interactions is also an issue. Unhappily, not every interaction with services always ends successfully. Many reasons exist for a failure. As the failing interaction may occur in the context of a set of interactions that constitute a life event service, it is important to discuss the consequences of such failure and the actions to take to remedy the failure. This type of problems is typically addressed using transactions, where a set of operations is made permanent if all complete successfully (commit), or undone if at least one fails (rollback). Transactions are difficult to accept in CHAPAS because it is the citizen who controls the transaction, and that would imply its ability to, in case of failure, undo services already obtained.

Another issue is identity management. It is a normal practice to require citizen authentication to obtain the desired service. Several authentication mechanisms can be used, e.g. passwords and smart cards. Authentication has the potential to become problematic in CHAPAS if most services handle citizen authentication independently. As many partial services may participate in a single life event service, possibly from different service providers, multiple citizen authentications may be required (in the worst case as many as the number of partial services), and this will not be practical. To avoid this, it is recommended that service providers adhere to, or organize themselves as, identity federations. An identity federation is an agreement made by a group of organizations so identities from one organization are accepted by the remaining organizations (Jøsang et al., 2007). An interesting feature they provide is single-sign-on, which allows a user to seamlessly access multiple services without having to continuously authenticate.

An important aspect to consider is the flow of identity information from the identity provider to the identity consumer that must follow the same pattern of document flow in CHAPAS, i.e., it must go through the citizen and under his control.

As demonstrated, the CHAPAS model is well suited to support the provision of life event services to citizens, preserving citizen's control of the flow of information and avoiding direct communication between service providers. This does not completely avoids the need for service providers to communicate, since not all business transactions in the public administration are performed in the scope of the provision of services to citizens or, being so, are meant to be controlled by the citizen (e.g. some citizen criminal information might have to be shared without the awareness of that citizen).

7 CONCLUSIONS

In this paper we presented how life event services

are implemented in the CHAPAS model. The fundamental characteristics of the model are discussed, such as (i) the centralization of the information flow between PA departments in the citizen (more properly in a citizen tool, Chappie, running in a citizen computer, that agnostically and under citizen control gathers and provides citizen information from/to services, respectively), and (ii) the guidance that each service provides, in the form of a Required Documents Policy, to assist Chappie in the determination of the documents that a specific citizen must provide (based on citizen circumstances, either extracted from documents' attributes or entered by the citizen upon request) and its gathering from issuer services.

Advantages and disadvantages of life event services in CHAPAS are discussed and we concluded that despite some highlighted difficulties, it still is advantageous for the citizen, as it brings him more control over the flow of his information, and for PA management, as it does not demand for dramatic changes on their internal processes.

ACKNOWLEDGEMENTS

This work was partially funded by FEDER through the Operational Program Competitiveness Factors - COMPETE and by National Funds through FCT - Foundation for Science and Technology in the context of the project FCOMP-01-0124-FEDER-022682 (FCT reference PEst-C/EEI/UI0127/2011) and PROTEC scholarship SFRH/PROTEC/ 49849/2009.

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