Introducing a Public Agency Networking Platform towards supporting Connected Governance

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Abstract. Connected governance constitutes the current trend regarding the provision of electronic governmental services. In the connected governance paradigm, public agencies share objectives across organizational boundaries, as opposed to working solely supporting autonomous portals in the e-government era. The establishment of connected governance poses new requirements, such as cross-organizational connectivity as well as back-office to front-office integration. Towards supporting this concept, we propose a Public Agency Networking Platform (PANP) facilitating personalized cross-organizational services, based on the concept of life events which represent human situations that trigger public services. The key feature of the platform is the simplification of the process execution workflow, as life events are accomplished through a user orchestrated process combining the functionality of discrete public agency applications. Emphasis has been laid on the citizen data protection by adopting a profile mechanism that enables the citizen to administer his/her own data loaded in his/her profile.

Keywords: Connected Governance, Cross-organizational Services, Personalization, Citizen Profile, Life Events, Governmental Portal, Privacy

1 Introduction

E-government should significantly contribute to government transformation process towards a leaner, more cost effective government. In particular, personalized electronic government services are supposed to give public organizations tremendous possibilities for their e-government strategies [1]. Fully personalized e-government portals, for example, should provide citizens with exactly those services they need, increasing citizen satisfaction levels, making communication between governments and citizens more effective and efficient while reducing bureaucracy. In a move towards efficiency many countries are in the process of integrating e-government policies and strategies. The concept of "connected governance" serves towards this direction. Derived from the whole-of-government approach [1], it aims at improving cooperation between public agencies as well as deepening consultation and engagement with citizens. Behind the concept of connected governance is a systematic approach to collect, reuse and share data and information [1]. For this concept to be accomplished, numerous e-government interoperability frameworks have been proposed in different countries, such as UK e-

Government Interoperability Framework [2] and NZ e-Government Interoperability Framework [3].

The existence of a "central portal" acting as a "single access point" for all services, either cross-organizational or not, is essential for the establishment of the connected governance paradigm. The way existing services, provided by independent public agencies, are integrated and coordinated to fulfil citizen requests is also an important issue. To this end, an approach has been proposed on the concept of "active life event portal" ([4], [5], [6]). Life events constitute a grouping mechanism of public e-services according to citizen needs. In particular, each life event corresponds to a workflow composed by existing e-services. In such a case, a number of issues mainly related to legal or governance-based obstacles may arise. Such issues mainly concern the transfer and processing of the citizens' data among different public agencies and the way the cross-organizational processes are orchestrated and by whom. Towards this direction, this paper proposes an alternative approach supporting personalized cross-organizational services, while focusing on citizens' awareness and acceptance over the overall workflow corresponding to a life event. Our approach is based on a platform accommodating personalized information produced by public agencies with the explicit consent of the citizen. This constitutes an alternative implementation for personalization in the context of e-government that ensures authorized usage of citizen data.

The proposed platform resembles a "virtual representative" for citizens using a profile mechanism. The platform utilizes the life events concept as described in numerous public sector portals ([7], [8]). Furthermore, it facilitates the maintenance of private citizen's folders containing all citizen-related data used during service request processing. The profile interacts with the public agencies through the *Public Agency Networking Platform (PANP)*, described in the paper. The platform should not be conceived merely as a way to facilitate the implementation public e-service portals, but rather as an alternative way of electronic interaction among citizens and public agencies. Hopefully, the platform could contribute to the vision of the connected governance and the creation of a public agency networking system.

This paper is organised as follows: Section 2 provides some background information regarding the transition from e-government to connected governance. Section 3 explains how connected governance can be supported. The functionality and architecture of the suggested Public Agency Networking Platform is presented in section 4, while section 5 discusses an example to illustrate citizen-government interaction through PANP. Conclusions and future work reside in section 6.

2 Background – From E-Government to Connected Governance

The term e-government or simple "e-gov" concerns the use of information and communication technologies (ICTs) to improve the activities of public sector organisations, focusing on services provided electronically (that is via the WWW) to the public. There are three main objectives of e-government: a) improving government processes, b) connecting citizens and c) enabling seamless external interactions between Public Agencies (PAs) at different levels (for example local, federal, European). Access to supported e-services is provided through e-government portals, either supporting an individual public agency or more commonly acting as a "single access point" for all e-services provided at local or federal level, such as DirectGov portal [9] or SIMPLEX program [10].

DirectEGov is the e-gov portal of the UK public sector. It is considered as one of the most sophisticated e-gov portals in Europe [1] in terms of integration. It provides "public services in one place". It usually redirects the user to the site of the governmental agency in charge where an on-line form provides the necessary information. The SIMPLEX program is a transversal instrument that groups and assembles simplification initiatives with significant impacts in terms of improving the quality of the relationship between the Public Administration, citizens and businesses in Portugal [10]. One of the key projects of SIMPLEX program is the Citizens Portal. It aggregates many e-services from different public agencies and facilitates their grouping and easy access.

The phrase "e-government" has been related to a continuous effort for public sector modernization since the 90's, but nowadays it is losing its appeal as a slogan or concept. As reported by the Organization of Economic Cooperation and Development (OECD) [11], "e-government initiatives in recent years are focusing on issues, such as how to collaborate more effectively across agencies to address complex intra-government problems and how to enhance public satisfaction and increase e-service usage". Public agencies have traditionally been compartmentalised. As governments are realizing that continued expansion in e-services is not possible without some kind of integration between individual public agency information systems, the increasing importance of cross-organizational coherence has clearly shifted the focus towards managing, integrating and coordinating government e-services [1]. Whereas the phrase "e-government" stipulates the need for developing e-services, the concept of "connected governance" [1] indicates the provision of e-services at the front-end supported by integration, consolidation and innovation of cross-organisational government processes at the back-end to improve service delivery. The distinguishing characteristic of connected governance is that public agencies share objectives across organizational boundaries, as opposed to working solely supporting autonomous portals in the e-government era.

3   Supporting the concept of Connected Governance

Connected governance is built upon the concept of interoperability, that is the ability of public agencies to share and integrate information using common standards [1]. The key features of connected governance are successful service innovation and multi-channel service delivery. Service integration depends on strategies, policies and architectures that allow data, IT systems, business processes and delivery channels to interoperate. If delivery channels and back-office processes are integrated, different service delivery channels can complement each other, improving the quality of both services and the delivery to government and citizens simultaneously [12].

As already mentioned, the establishment of connected governance presupposes the existence of a central portal acting as a single access point for all services, either cross-organizational or not. Existing services provided by independent public agencies should be integrated and coordinated in a seamless manner in order to fulfil citizen requests. Fulfilling citizens' requests implies that their needs have been effectively identified. However, government authorities have their own view of the world providing public e-services either through the central portal or alternative delivery channels. Most existing e-gov portals, as DirectEGov, group provided services based on areas of interest, to facilitate the citizen identifying the services that he/she should use to satisfy a particular need. An alternative approach, as stated earlier, is based on life events. A life event is defined as "a situation of a human being that triggers public services" [6], such as "fill an

employment application" or "getting married". In both cases, the citizen should initiate the corresponding services, which may be executed in the relative public agency individual site, as in the case of DirectEGov portal [9].

The active life event portal approach ([4], [5], [6]) facilitates the representation of life events as workflows composed by pre-existing e-services. In such a case, the citizen initiates a predefined workflow instance, corresponding to the life event describing his/her situation, e.g. "fill an employment application". Such an approach promotes the concept of connected governance. Numerous ongoing research efforts focus on the way individual services are composed to workflows triggered by life events. Some of the current EU projects towards this direction are:

Advanced eGovernment Information Service Bus (eGov-Bus) project (www.egov-bus.org). According to project synopsis, the eGov-Bus is a dynamically adaptable information system supporting life events experienced by the citizen or business serviced by European government organizations. Governmental portals are transformed into virtual agencies, which cluster functions related to the customer's everyday life, regardless of the responsible agency or branch of Government. Life event workflows are defined by the Workflow Process Description Generator (WPDG) based on the domain ontology pertaining to a life event class presented to the system by a citizen. Existing natural language technologies will be integrated into the WPDG environment, both supporting the full text categorisation facility as well as providing the speech recognition/generation functions.

SemanticGov project (www.semantic-gov.org). SemanticGov project utilizes Service Oriented Architectures paradigm and Semantic Web Services technology to automatically compose life events on the basis of public service descriptions that are given in Web Service Modelling Language (WSML). The architecture proposed by SemanticGov is based on the Pan-European E-Government Services (PEGS) [4] and uses concepts and technologies related to Web Service Modelling Ontology. The PEGS infrastructure includes the service requestor, the front-office application, the application layer and service providers. The application layer includes such modules as Service Discovery, Service Composition, Data mediation, and Process Mediation [5].

OneStopGov project (www.onestopgov-project.org). The project aims at specifying, developing and evaluating an active life-event oriented, integrated, interoperable single sign-on platform for online one-stop government. This platform is accompanied by a coherent framework for realising and exploiting online one-stop government at all levels. Active life events are modelled in Business Process Modelling Notation (BPMN). Their definitions are expressed in Business Process Execution Language for Web Services (BPEL4WS). The public services are specified in Web Service Description Language (WSDL) and handled by a Universal Data Description Interface (UDDI) [6].

The main goal of the above projects is to facilitate government service delivery to citizens in an automated and seamless fashion. The citizen has a "black box" view of each life event, since he/she is informed about the outcome without having any notion of individual workflow steps. Thus, a number of issues mainly related to legal or governance-based obstacles may arise concerning the transfer and processing of the citizens' data among different public agencies and the way the cross-organizational processes are orchestrated and by whom. Legal obstacles refer to collecting and storing data on user characteristics. In many countries, the transfer and processing of citizen's data between different agencies of the public sector is prohibited by the legislation, thus making cross-organizational cooperation unfeasible, even though such effort is technologically safe. Governance-based obstacles relate to the question "what

department, administration, ministry, and ministers are responsible for what?" [13]. This question is particularly relevant when implementing cross-organizational services that combine several processes of different public agencies. Where should each service be executed? Who is responsible for the citizen's data exchanged between public agencies?

To overcome such difficulties, we propose that the citizen should obtain a "white box" view of the services provided to him/her through the central portal. That is, the citizen should be able to monitor individual steps of the workflow triggered by each life event, give his/her consent before initiating each individual service offered by different agencies and be actively involved in where, how and for how long individual data will be stored while his/her request is being processed. Such an approach may increase citizen's trust to the provided services [14].

An additional aspect of connected governance is the enhancement of public satisfaction and increase of e-service usage. A way to augment citizen satisfaction from government services is the provision of personalization capabilities. The objective of a web personalization system is to "provide users with the information they want or need without expecting from them to ask for it explicitly" [15]. To achieve these objectives, web personalization process usually consists of (a) the collection and pre-processing of Web data, including content, structure, usage and user profile data, (b) the analysis and discovery of correlations between such data, and (c) the determination of the recommendation methods for hyperlinks, queries, products and user interface [16]. The means to analyse the Web data include demographic filtering, collaborative filtering, content -based filtering, case-based reasoning, rule-based filtering, Web mining and some hybrid approaches [17]. The main idea behind these algorithms is to compare the navigational behaviour of an active user with previous users in order to cluster similar users and detect user patterns.

Personalization, in the context of the connected governance paradigm should be revised. The user profile should provide personalized dynamic information about the public agencies in question with the explicit consent of the user. None of the information that the profile contains should be shared with the recommendation engine for the necessary statistical reasoning, even thought this could be done anonymously. This notion is a way to prohibit the privacy violation and enhance the trust between the platform and the citizen. Furthermore is compliant with the Directive 1995/46/EC on Data Protection (section VIII) and the Directive 2006/24/EC on Data Retention (Article 7). The citizens, through their profiles, should feel that they are the exclusive administrators of the information that is loaded into the profile. However, as discussed in [13] and [18], there are obstacles towards the personalization of electronic services provided by the public sector. These obstacles concern both the citizen and public agencies and are analytically discussed in [13]. Some of the most important ones concerning the citizen are: a) access mechanism of services, b) control the user has over the whole process, c) privacy of sensitive user data, d) trust and e) acceptance of the delivery channels and the back-end processes. Some of the most important ones concerning public agencies relate to legal, process-based, financial, governance-based and technical issues. Building a connected governance platform overcoming most of the identified obstacles should lead to a more personalised citizen view of electronic services offered, which would consequently enhance public satisfaction and increase e-service usage.

4 Public Agency Networking Platform

The aim of our effort is to suggest an alternative approach for connected governance focusing on personalization and citizen acceptance issues. Thus, a "white box" view of the provided services is adopted. To this end, we propose an integration platform, named *Public Agency Networking Platform (PANP)*, ensuring a single sign-on access to cross-organizational services in a personalized fashion based on life events. Cross-organizational life events are accomplished through the citizens' active involvement, thus enhancing citizens' trust in the platform. Another key feature of the platform is the modular design which enables the use of the platform in every administrative level (local, federal, European). In the following, PANP proposed functionality is analytically described.

Through PANP, citizens are able to create a profile and progressively arrange his/her private space included in the profile by integrating applications specifically implemented for this purpose by public agencies. Public Agency applications can be considered as the main execution component of the platform and are executed within PANP. They act as gateways between the citizens and the public agencies. They can be installed and uninstalled in the citizens' profile, with his/her consent, in a modular fashion. The profile can be considered as a private virtual folder where citizens' data from the government agencies can be stored either permanently or temporarily, e.g. during a life event processing. Special effort has been made so as the platform to be compliant with the Directive 1995/46/EC on Data Protection (section VIII), the Directive 2006/24/EC on Data Retention (Article 7) and the Directive 2002/58/EC on Privacy and Electronic Communications. In the conceptual level, the owner of the profile and the data it contains is the citizen himself. In the physical level, the platform should be hosted by a commonly accepted and independent authority, constitutionally and legislatively responsible for the protection of citizens' personal data. Additionally, it is up to the citizen to define whether his/her sensitive data will be permanently stored within the platform or be acquired in real time from the public agencies, upon citizens' log-in, and stored in a temporal session.

Citizens have full control on all the data and applications stored or used in their profile. In that sense, the accomplishment of a life event is user-orchestrated. To accomplish a specific life event, one or more public agency applications may need to be integrated in the profile. The communication between them is accomplished by the information they obtain or store within the profile. Thus, each public agency application has no notion of the existence of others, while the workflow corresponding to a single life event is formulated based on data exchange performed within the profile, fully controlled by the citizen. A recommendation mechanism assists citizens to identify the proper applications needed to accomplish a specific life event. Citizens can be authenticated by a central authentication mechanism in PANP. However, user authentication may be independently performed for a specific application either via standard login/password fashion or using electronic signature stored in a certificate, if additional security is needed by the corresponding public agency.

It is worth mentioning that cross organizational interoperability is achieved through the user profile that acts as a "meeting point" or a "point of interaction" for the public agencies to interact. A profile mechanism as such, can replace the government-to-government interaction with multiple government-to-citizen interactions. The platform should provide the necessary tools so that the applications can be integrated and consequently seamlessly present the information to the citizen. This can involve news feeds, notifications and alerts.

The platform provides two main interfaces, one for citizens and one for public agencies. PANP interacts with citizens using profiles, while public agencies interact with it using the *Public Agency Application Discovery and Integration (PAADI)* registry. Profiles are created based on the *Profile Management* mechanism. Profile management updates the citizens' profiles based on the public agency applications they have installed. In a similar fashion, PAADI is administered by the *PAADI Management* module, which is responsible for ensuring public agency applications authentication and availability. *Alerts and Feeds Mechanism* supply the profile with the public agencies' news feeds. Public agencies news feeds, also available through PAADI, can be considered as a personalized way of communicating with the citizens. They include information such as notifications about the tax filling or the payment of a public fee. Alerts are urgent notifications. The *Recommendation Mechanism* is a part of the personalization features provided by the platform. This module assists the citizen to arrange his/her profile, for example install the necessary applications to accomplish a life event. Upon removal of an application, this module will notify the citizen for the possible implications on the execution of the depended applications. The recommendation mechanism uses semantic tags to identify the related piece of information for a specific task and consequently proposes the applications to be added.

All the modules mentioned before are based on a platform-specific *API* and *PANP ML*. The proposed API should utilize web services of government agencies, corresponding to applications registered in PAADI. It should act as a gateway between custom agency web services and the platform. The main concern in API implementation focuses on confidentiality, data integrity, and availability of information. While confidentiality deals with the unintentional disclosure of information outside the authorized parameters, data integrity assures the trustworthiness of the information, and availability ensures that the information is made available to requesting authenticated clients. The mark-up language (PANP ML) should contain the required tags to implement citizen's profile. Thus, it should contain presentation and semantic tags facilitating citizen-related data presentation and exchange between public agency applications. The implementation of the PANP ML is still an open issue as many requirements should be fulfilled concerning the way the information is extracted and retrieved from the user's profile data and the way the processed data is represented to the user. It should also be extendable. The framework is supported by proper Authentication, Data Integrity, Availability and Authentication mechanisms. An overall view of the proposed framework is presented in figure 1.

Communication between the citizen and the PANP may be done using HTTPs/SSL mechanisms. After registering for the first time, the citizen is asked to ensure the validity of some personal information that is preloaded by the corresponding agencies, for example social security number. He/she is also asked to change the initial password to a new sophisticated one. Then, the citizen may search for a public agency application in the PAADI. The applications have been implemented by the IT sector of the agencies using PANP ML and the platform API. Before the application is installed in the user profile, it requires the user consent to use the profile data. This is crucial to enforce citizen's data and privacy protection acts. Citizens may add as many applications as possible, thus initiating multiple connections with the public agencies. In order to accomplish a life event, the citizen orchestrates the relative applications already installed in his/her profile. We believe that this approach will simplify the complex process execution mechanisms proposed in the related projects and will enhance the citizens' trust to the platform.
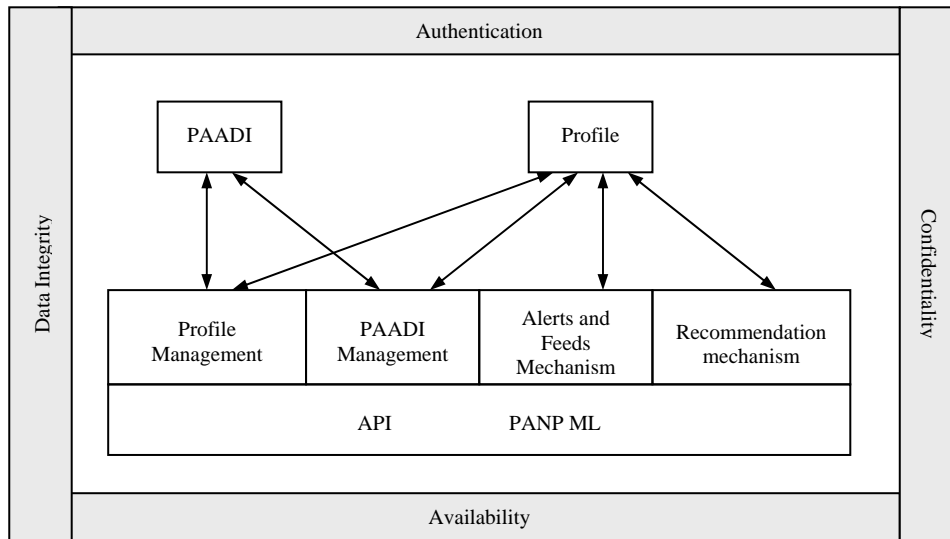
Fig. 1. Public Agency Networking Platform

The anticipated benefits will affect both citizens and public agencies. From the citizen point of view, the benefits, compared to other approaches such as active life event portals, come in the form of the explicit information management and user orchestration, as far as profile applications are involved. This assumption requires the user to obtain a clear view and knowledge of his/her profile applications involved every time a service is requested, i.e. a life event appears, and especially the data required and produced by them. The recommendation mechanism may assist the citizen to include in his/her profile all the public applications needed to service a specific life event. PANP approach may also contribute to overcome personalization obstacles, identified in [13], from the citizen's point of view as discussed in Table 1.

Table 1. User Obstacles to personalization [13] and PANP proposed solution

Obstacle	Solution
Control	The citizen has full control of both his/her data and public applications that will use them.
Privacy	Profiles are private by default. Additionally, every action made to the citizen profile requires explicit consent.
Trust	The citizen owns his/her data and is responsible for the use or the misuse. The only concern is addressed to the reliability of the public agency in charge to administer the platform.
Acceptance	We can not predict the acceptance of the platform. However, at first, some motives should be given to the initial users so as the network effects to take place.
Access	Single sign-on vision supports user accessibility. The platform could be easily deployed to mobile devices for further use.

From the public agencies point of view, along with the increased efficiency and quality of public service delivery, many legal and technical issues can be resolved as shown in Table 2.

Table 2. Organizational obstacles in the personalization [13] and PANP proposed solutions

Obstacle	Solution
Legal	The user owns his information and is responsible for the use or the misuse. Every action made to his profile (application installation and information access) requires his explicit consent.
Process based	The public agencies will maintain their infrastructures concerning the processes they accomodate. However interfaces will have to be implemented so as to offer their applications in the PANP Platform. It is assumed that this is less demanding than altering the internal infrastructures to offer cross-organizational services. We believe that this approach will require the minimum of public agencies' process re-engineering, as web service interfaces will interact with the platform through the API and the PANP mark-up language. No business process orchestration is needed as the platform is user orchestrated.
Financial	The implementation of the required interface can be regarded as an extra cost. However, overall the use of the platform will eliminate the need of having a personalized portal in every public agency, thus reducing cost.
Governance Based	The user himself is responsible to orchestrate the application workflow.
Technical	The user profile acts a common place for the public agencies to post the user information. The installed applications can access the user information. With this approach, no common databases are required to share the cross-organizational data .

5 A C2G example

To illustrate the benefits of PANP approach, let us assume an example involving a new PANP user, named Helena Pap. Helena wants to accomplish a specific life-event, i.e. to fill an application for a job opening in the public sector. It is worth mentioning that employment and job seeking is considered as a common e-government service, implemented in most government portals. Helena has graduated from the Department of Informatics of the University of Athens and holds an M.Sc from the Harokopio University of Athens. She has been working as freelancer for three years, as certified by the Public Insurance agency. In the real world, Helena would collect the necessary transcripts from different public agencies and submit an application to personnel selection agency. The whole procedure should recur in case Helena wishes to apply for a new job opening. The conventional way to submit such an application is presented in figure 2, as UML activity diagram.
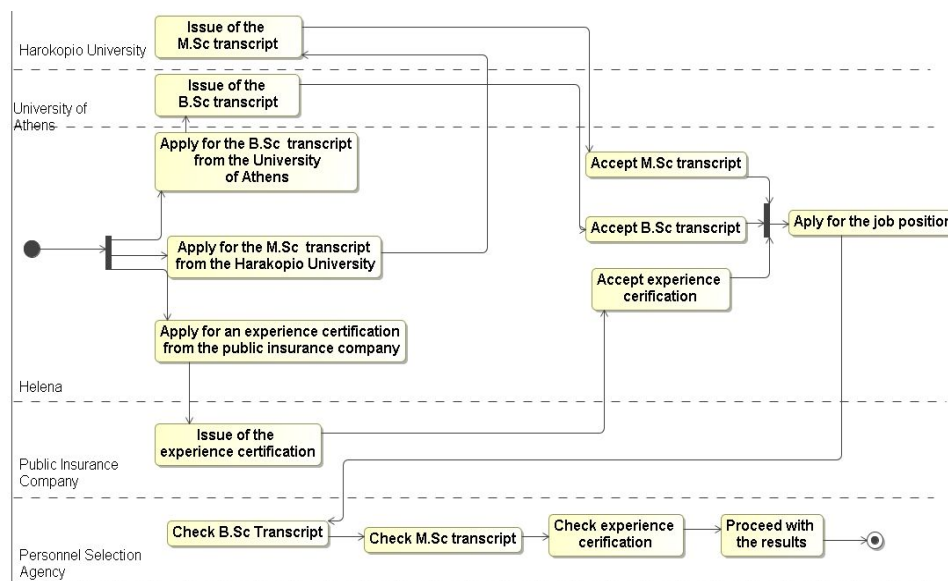
Fig. 2. Conventional procedure of applying for a job opening in the Personnel Selection Agency

In the electronic world the procedure is simplified. Upon log-in in PANP, Helena enters her profile. Some personal data (name, surname, ID number) have already been uploaded and Helena is asked to check their validity. Since Helena's task is to apply for a job opening, she searches the PAADI and adds in her profile the "Apply for job position" application, specifically implemented for the job opening in question by Personnel selection agency. Helena is informed by the Recommendation mechanism that her profile should contain some specific information concerning her B.Sc and M.Sc studies and her experience for the application to use. The information concerning the B.Sc can be obtained using "Issue pf a UoA BSc transcript" application that initiates the interaction with the University of Athens. The application explicitly requires Helena's consent to use her personal data. Then, a corresponding web service initiated in the University of Athens site receives her name, surname and ID number and returns her degree title, grade and date of graduation, which are stored in her profile. Helena is able to decide whether the results will be permanently or temporary available within her profile or whether they should be periodically update or not. Consequently, she adds a similar application created and registered in PAADI by the Harokopio University of Athens that provides information about her M.Sc. Then, Helena installs "Issue an experience certificate" application initiating a channel with the public insurance agency that proves her experience. The agency returns and posts the information that Helena has been insured for 3 years in her profile. The "Apply for job position" application can now be performed using all her profile information mentioned above. Explicit user consent is required. The information is transferred to the Personnel selection agency for further processing and a receipt is returned and posted in her profile. When the period for submitting job applications expires, Helena will be notified with an alert from the Personnel selection agency concerning the outcome. Unfortunately, Helena is not qualified for this job opening, but a month later, the Personnel selection agency issues a new job opening. PANP recommendation mechanism can notify her for this. To do so, it uses her profile information after acquiring her consent, thus implementing personalisation services. The

only thing Helena has to do is to add the application for the new job opening in her profile. The information about her bachelor and master degree remains the same, while the information about the insurance time is altered and a month is added to her overall insurance period. The example is demonstrated in figure3.
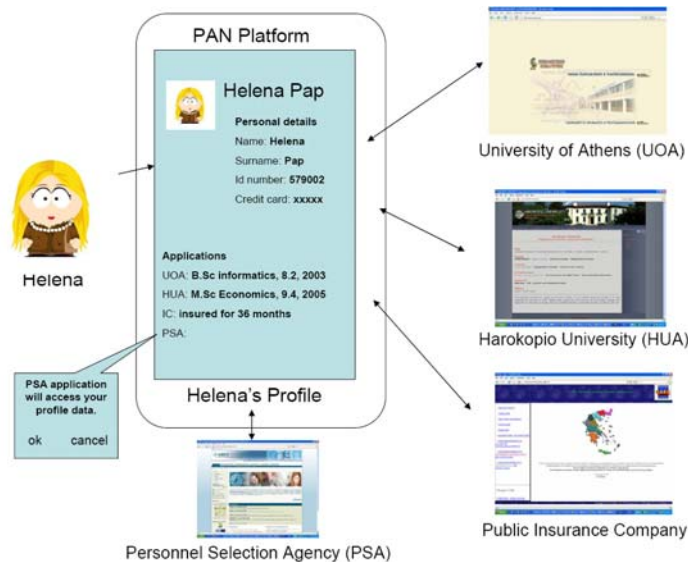

Fig. 3. The "Application for Job opening in the public sector" Example

In the above picture, a user orchestrated workflow is depicted to accomplish a job application in the public sector. Multiple applications are installed gathering the required user information from the public agencies. It should be mentioned that there is no interaction among them. Data exchange is implemented through the user profile.

6. Conclusion - Future Work

The current trend in the provision of the e-government services is described by the concept of the connected governance. Towards supporting this concept, we presented a Public Agency Networking Platform (PANP) facilitating personalized cross-organizational services. PANP a) assures the platform extensibility and modularity, b) eases the integration with existing e-government infrastructures as the platform relies on well defined existing mechanisms as web services and c) is compliant with the main law regulations and directives especially in the area of security and data protection as the user holds his/her own data in his profile and every action made in the platform requires his/her explicit consent. In contrast to other platforms and integration frameworks, PANP simplifies the process execution workflow as life events are accomplished through a user orchestrated process combining the functionality of discrete public agencies applications.

Our future work involves the implementation of a prototype. The platform API libraries should be implemented and the semantic and presentation tags of the PANP

mark up language should be defined. It is our intention to provide a quite flexible and safe infrastructure for the public agencies IT departments to implement PANP applications. In addition, security issues will be thoroughly examined. Finally, we will further explore information extraction from the profiles, as it remains an open research issue.

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