Design of an Open Social e-Service for Assisted Living

Gustaf Juell-Skielse and Petia Wohed

Stockholm University
{gjs, petia}@dsv.su.se

Abstract. E-government has emerged as one of the most promising means to reform the public sector. E-government is now being used to improve services for assisted living. The purpose of assisted living services is to provide ways for elderly people to continue to live at home. However, these services require formal decisions by local government officials. Therefore Swedish municipalities aim to move control toward citizens to reduce authoritative barriers and to simplify administration. In this paper we report experiences from developing an open social e-service for assisted living[1]. The major objectives are to relocate control to the citizen and to establish a highly integrated and efficient administrative process. It is designed to meet legal requirements of the Swedish Social Services Act. In order to achieve the objectives several process innovation techniques have been applied. During the design process we experienced several legal, organizational and technical challenges which we report in this paper.

Keywords: assisted living, e-government, e-services, social services, street-level bureaucracy

1. Introduction

Assisted living services are becoming more and more important due to the increased share of elderly in the population of Western countries. In 2020 the share of older people in Europe will be almost doubled compared to 1960 [1]. Assisted living services can increase the quality of life by helping elderly to live in their homes longer and to stay integrated in social life [1]. In addition, the costs for assisted living services are significantly lower than the costs of providing special housing [2].

In Sweden, services for assisted living are usually administrated and provided by the social services committee of the municipality where the person resides. Although few applications for assisted living services are rejected, they require extensive investigations and formal decisions by local government officials. Therefore, Swedish municipalities consider to provide assisted living services in a more open and efficient manner. In addition, Swedish municipalities aim to utilize e-government technology, e.g. e-services. Through open social e-services the fundamental idea is to move decision control closer to the citizen, to increase service access and transparency and to decrease service administration.

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[1] This is not to be confused with Google open social initiative.
http://code.google.com/apis/opensocial/

In this paper we report experiences from developing open social e-services. During the design process we experienced several legal, organizational and technical challenges. More specifically we report:
- A design of an open social e-service for assisted living.
- Potential benefits of introducing open social e-services in the administration of assisted living services.
- Challenges during design and development of the open social e-service for assisted living.

The design of the open social e-service for assisted living will serve as a proof-of-concept and a foundation for future development. The potential benefits will serve as variables for measuring costs and benefits of open e-services for assisted living. By solving some of the challenges the reported work paves the way for e-government initiatives in the social services area. Other challenges provide valuable input to make future development of e-services more effective.

The paper is structured as follows. In section 2 we present the assisted living service for which we design an open social e-service solution. In addition we discuss assisted living services and frameworks for process innovation, benefits analysis and e-government challenges. In section 3 we cover the method used in our research. Section 4 presents the results: design of an open social e-service solution, analysis of potential benefits and experienced challenges. In section 5 we conclude the paper with a suggestion for future work.

2. Extended background

In this section we present the assisted living service for which we design an open social e-service solution. In addition we discuss frameworks for process innovation, benefits analysis and e-government challenges, which are used in the design of the open social e-service.

2.1 E-Government Case Description

Sweden is currently ranked as the leading country in e-government readiness [3]. Järfälla is one of Sweden's 290 municipalities and located 20 kilometers Northwest of Stockholm. With 65.000 inhabitants it is, by Swedish standards, a relatively large municipality. An important responsibility for the municipality is to provide assisted living services for elderly and disabled citizens. The Järfälla Social Service Council care for approximately 1.540 elderly and 860 disabled citizens [4]. The cost for social services in Järfälla is somewhat lower than the Swedish average. The net annual cost per capita for care of elderly and disabled are 9.446 SEK as compared to the Swedish average of 13.172 SEK.

Assisted living services include both technological and organizational-institutional innovations to enhance the autonomy and quality of life of elderly people and to decrease the cost for elderly care [1]. The assisted living services which are

subject to be offered as open social e-services in the municipality of Järfälla are emergency help telephone service, part-time successors and companions [5]. Emergency help telephones provide around the clock in-door emergency treatment assistance which means that the citizen can get in contact with care personnel in case of emergency. Part-time successors provide in-door autonomy enhancement services to relieve relatives from the responsibility of taking care of the elderly or disabled under shorter time periods. Companions provide outdoor autonomy enhancement and comfort services for people who find it hard to get to and from activities, such as hair-dressing and social events.

The administrative process for providing emergency help telephone service was selected for developing an open social e-service. There were several reasons behind this decision: First, an emergency help telephone service is often the first social care service that a person applies for. Second, most of the applications for emergency help telephone services are accepted. Third, the application process for emergency help telephone services has recently been thoroughly analyzed and simplified by Järfälla municipality. Fourth, the administrative process for handling applications for emergency help telephone services could serve as a benchmark for several other services.

2.2 Process Innovation Techniques

In e-government, information and communication technology is used to improve government processes. Davenport [6] identifies nine different ways in which information and communication technology can be used to improve processes. In turn, these process improvements can generate quality improvements, time reductions and economic benefits. Mansar and Reijers [7] categorize successful process redesign heuristics, such as control relocation, contact reduction, control addition, case types, exception, task elimination, task automation and integrative technology. *Control relocation* [8] is when controls are moved towards the customer. Control relocation is used to reduce back-office administration and errors. For example, control is relocated when citizens are empowered to perform their own investigation on which a formal decision on assisted living services is made. Errors can be reduced by digitally collecting application data at the source, e.g. letting citizens fill out electronic application forms. *Contact reduction* [9] is when contacts with customers and third-parties are reduced. For example, telephone contacts confirming the receipt of applications are replaced by immediate electronic confirmations. *Control addition* is when completeness and correctness is checked at the information source [10]. It is used to reduce rework. In e-services, controls are usually included in electronic forms used to collect data. The redesign heuristic *case type*, is used to reorganize processes, e.g. when a set of tasks are broken out of a larger process and combined into a process of its own [11]. *Exception* is when handling of exceptions is isolated into separate process flows [11]. *Task elimination* is when unnecessary tasks are removed from the process. *Task automation* is when manual tasks are automated [12]. It is used to decrease execution time and cost. *Integrative technology* is when technology is used to eliminate physical constraints in a process [6].

2.3 Benefits Analysis of e-Government Initiatives

Benefit analyses are used to evaluate effects, potential and actual, of process improvements, e.g. enabled by investments in e-government technology. Gupta and Jana [13] suggest a combination of hard and soft methods to evaluate e-government initiatives. By doing so, multiple views and multiple skills are engaged in balancing the needs of being rigorous enough in the analysis with the needs to be flexible in order to be relevant for different stakeholders. A specific method for benefits evaluation of IT-investments and process changes is Peng [14]. Peng is widely used in both the private and the public sector. The method consists of ten steps, and ideally it involves users and managers as well as functional and technical specialists from the organization. Benefits are identified in workshops and organized in an objectives structure that depicts the relationships between benefits, process changes and IT functionality. All benefits are expressed in financial terms although the intention is not to achieve accounting precision. In order to validate the results, the benefits are classified as direct, indirect and intangible benefits. Identification of IT-costs is supported by a pre-defined list of costs and types. Finally, the net value of the benefits and costs are calculated and managers responsible for the realization of the benefits are appointed.

2.4 Expected Challenges

Municipalities that introduce e-government face a number of challenges. Gil-Garcia and Pardo [15] have organized e-government challenges reported by several authors in five challenge categories: information and data quality, information technology, organizational and managerial, legal and regulatory as well as institutional and environmental. Typical data related challenges include insufficient quality of data, lack of data and inconsistencies of data. Information technology challenges are for example the incompatibility between older and newer system approaches, i.e. universal systems and component-based or service oriented systems [16]. Examples of organizational and managerial challenges include diversity of the organizations involved in e-government initiatives and conflicting goals within government organizations [3]. Legal and regulatory challenges include the need for adapting laws and regulations to new technologies, e.g. electronic identification and digital archiving. Institutional and environmental challenges include for example privacy concerns as well as policy and political pressure.

3. Method

In this paper, the goal is to move control toward citizens and to simplify administration in social services, i.e. assisted living services. We use design research [17, 18, 19] to seek for new solutions based on advances in information technology. Design research is an area within the IS-field that intervenes to create alternative futures instead of studying the past to discover truth.

We went through the following steps to develop the open social e-service. First an as-is analysis of the current process was performed. A number of workshops and in-depth interviews were carried out to gather information about the existing process and related sub-processes. Representatives for all roles involved in the current process participated in the workshops, i.e. local government official (LGO), accounting assistant, emergency group (a sub-supplier), and installer (a sub-supplier to the emergency group). The discussions were steered to retrieve the different process steps, the responsible actors and the data processed at each step. The processes were documented in YAWL [20]. For the resource and data perspectives additional visualization techniques were used. YAWL was chosen because it is a powerful process modeling language with an open source supporting environment. It is based on results from the Workflow Patterns initiative (www.workflowpatterns.com) and supports a wide variety of patterns compared to other business process management systems [21, 22]. For our project, it was essential to evaluate the applicability of an open source business process management tool.

At the end of the as-is analysis a prototype in YAWL of the main process was demonstrated to the work group as a process validation means. After that a performance analysis was carried out, i.e. the execution time of the individual tasks was measured or estimated[2] and documented. Finally, the handling of a pilot case of the emergency telephone application was video recorded and the movie was used by the project team to validate the as-is process among the municipal executives.

The results of the as-is analysis were: (a) process models for: the emergency help telephone application and installation process and the two related processes, i.e. periodical re-investigation and prolongation of the service subscription as well as cancellation of the service; (b) a list of problems caused by limitations in or the utilization of the current IT-system identified during the analysis.

In parallel with the as-is analysis, an investigation was initiated on the legal issues related to the transformation of the service to an open social service. For this the Department of Law at the University of Lund was consulted. Three alternatives from a legal point of view were outlined and evaluated from three perspectives: process-changes, technical impact of the proposed solution and benefits. One of these alternatives was selected for implementation by Järfälla Social committee.

Based on the as-is analysis, and the results from the legal investigation a to-be process was designed together with the work group established earlier. The group was first presented with a prospective solution through a small theatrical sketch. This prospective solution was our revision of the current process so that 1) the problems identified in the as-in process were solved and 2) the benefits of e-services technology added to the process (e.g. relocation of the application registration task from a local government official to a citizen). A prototype in YAWL for the designed solution was then developed and demonstrated to the work group for validation. In parallel, work with the interface design for the e-service was carried out.

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[2] A telephone call with the citizen is an example of a task for which the performance time was estimated. As the conversation time may vary significantly between different citizens an estimated average was agreed upon.

4. Results

The goal is to design an open social e-service for assisted living services. The objectives are to move control closer to the citizen and to reduce bureaucracy. Control can be moved closer to the citizen by the use of interactive e-services and increased transparency. Bureaucracy can be reduced by eliminating formal decisions and decreasing administrative tasks, such as manual data entry and manual case filing.

4.1 Design of the Open Social e-Service

Three different alternatives to an open social e-service were identified.
− Open for anyone
− Open with eligibility criteria
− Open after general approval

Open for anyone is a fully open service with no municipal decision making where citizens pay a fee for service provisioning. Open with eligibility criteria is a service open to citizens which meet pre-defined eligibility criteria. Open after general approval is a service open to citizens who already have received a municipal approval for social services. Based on the approval, these citizens can then order a number of available assisted living services based on his or her perceived needs.

The first solution *Open for anyone* was found to be complicated from a legal standpoint. The social services act requires that decisions are made on an individual level in order to provide documentation, to provide the possibility to file legal claims against the decision and to provide a basis for communication to the individual. Further, the social service council requires formal and individual decisions in order to document information about individuals that is used for future care decisions and for providing statistics to the government. In addition, the county council has recently criticized a number of municipalities providing emergency alarms as open services without formal decisions [23]. The city council's view is that emergency alarms ultimately are care services due to the life saving actions that may be provided in case of an alarm. The second solution *Open with eligibility criteria* was legally acceptable if the decision is taken based on a number of clearly defined eligibility criteria and that the individual could be satisfactorily identified. If the citizen does not meet the eligibility criteria a manual application process should be initiated. Given these circumstances, a formal decision could be automated. In the third solution *Open after general approval* the citizen is offered a selection of living assistance services based on an initial formal decision. The citizen can then choose one or more living assistance services from this selection of services over a period of time. Järfälla Social committee decided to go for the second solution "Open with eligibility criteria".

The administrative process for the open social e-service was detailed according to the solution "Open with eligibility criteria", see Figure 1. The process starts with a citizen filling out an electronic application and submitting it to the municipality. The application form contains the citizen's personal and contact data, information of the citizen's health situation that may be of importance when providing the living assistance service, as well as data for a number of prerequisites and eligibility criteria

defined by Järfälla Social Committee [24], see Figure 2. The prerequisites aim to make clear the necessary conditions, e.g. that the citizen is able to use the emergency help telephone equipment. In addition, there are two eligibility criteria: perceived insecurity and perceived risk of falling. A citizen is eligible for the emergency help telephone service if at least one of these criteria is met.

An individual and automated decision is made based on the input provided for the prerequisites and eligibility criteria. In case the criteria are fulfilled, the application is approved, the citizen notified, and installation organized and carried out, see Figure 1.

Fig. 1. The to-be administrative process for the open social e-service.
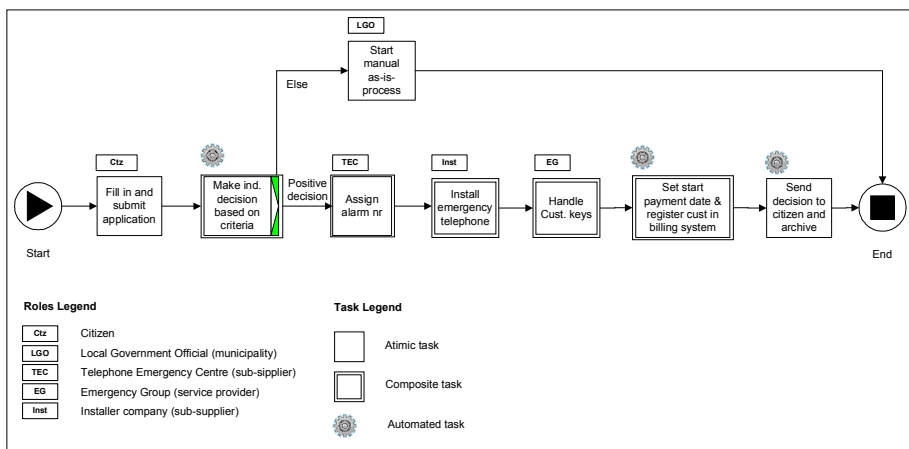
Fig. 2. Application form including prerequisites and eligibility criteria [26].

First an alarm number is assigned to the citizen by the Telephone Emergency Center (TEC). TEC is a national organization providing the technical infrastructure for directing emergency calls from citizens to different emergency groups. When a citizen has received an alarm number, installation of the emergency telephone equipment can take place. Installation is organized and carried out by a third party provider, in the model referred to as Installer. During the installation, keys to the citizen's home are collected (so that help can be provided even if the citizen is not able to open the door). The keys are handed over to the Emergency Group (EG) where they are allocated to a storage space and kept in a secure way. Finally, start date for the service is derived (usually the same as the installation date), citizen added to the billing system and informed about the start of the service and payment date.

As nearly all of the applications today result in approvals, the expectation is that the process proposed in Figure 1 will be used for most of the applications in the future. However, a fundamental standpoint is that negative decisions shall never be automated. For this reason, if a citizen does not fulfill the prerequisites and eligibility criteria, the case will be handled manually.

4.2 Analysis of Potential Benefits and Use of Process Innovation Techniques

The potential benefits of the administrative process for the open social e-service are expressed as a reduction in work time. The total potential benefits are estimated, using Peng (see section 2.3), to between 53 and 69 minutes per case. This is an effect of the process redesign heuristics (see section 2.2) applied to the to-be administrative process. The potential benefits and applied redesign heuristics are presented in Table 1. In the first task *Fill in and submit application* control is relocated to the citizen by letting the citizen perform her own investigation through the use of an electronic form where required information is made explicit and input data controls are added. Integrative technology is used by a workflow system supporting the administrative process from start to end. In the second task *Make individual decision based on criteria* the decision task is automated for approved cases. Approval is based on prerequisites and eligibility criteria. The case is redirected to an exception handling process if the prerequisites or eligibility criteria are not met. In the tasks 3-7, task automation and integrative technology are applied in the same fashion. In the third task *Assign alarm number* control is relocated to a third-party service supplier. In the sixth task *Set start payment date and register citizen in billing system* a service fee decision is automated and tasks related to reduction service fee applications are broken out into a separate process. In summary, the use of an e-service in combination with a workflow system will have a significant impact on the administrative process. Since a large number of tasks are relocated, eliminated or automated work organization will change.

Table 1. Potential benefits and applied process redesign heuristics.

Task	To-be	Applied process redesign heuristics	Potential benefits (minutes of work time)
1	Fill in and submit application	Control relocation, Control addition, Contact reduction,	17-22

		Integrative technology	
2	Make individual decision based on criteria	Integrative technology, Task elimination, Task automation, Exception	8
3	Assign alarm number	Task automation, Control relocation, Integrative technology	5
4	Install help telephone	Integrative technology	3-5
5	Handle citizen keys	Task automation, Integrative technology	3
6	Set start payment date and register in billing system	Task automation, Case type, Integrative technology	11-15
7	Send decision to citizen and archive	Task automation , Integrative technology	6-11

4.3 Experienced Challenges

Several challenges were experienced during the design and development of the open social e-service for assisted living: conflict of interests, technological incompatibility, lock-in relationship with IT-suppliers.

Conflict of Interests. There are two groups of interests. On the one hand there are the director of the Social Services Committee and the local government officials. On the other hand there are the middle managers reporting to the director and responsible for managing the work of the officials.

The director and the officials see opportunities in relocating control toward citizens. This means that citizens instead of local government officials become responsible for decision making and for providing input data. The director argues that open social e-services support Järfälla's aim to become more open and transparent to citizens. The director refers to changes in other areas of social services where it has been possible to successfully remove decision making, e.g. simple home maintenance assistance for elderly citizens, such as change of light bulbs. The officials want to remove administration from their duties and through open social e-services they become no longer active in the operative process.

The middle managers are hesitant to relocate control toward citizens. They want to keep decision making since individual decisions make it possible for municipalities to collect social information about individuals. Middle managers argue that emergency help telephone services differ from simple home maintenance assistance services due to the caring nature of emergency help telephone services. It is also the city council's view that emergency help telephone services ultimately are care services due to the life saving actions that may be provided in case of an alarm [23]. In addition, the National Board of Health and Welfare requires municipalities to provide statistics about assisted living services which is simplified through the availability of individual social information.

We believe that the above conflict of interests depends on that open social e-services challenge the current way control is exercised within the Social Services Committee. Today, control and implementation of policies is to a large extent

exercised by local government officials. They are so called street-level bureaucrats [25, 26] that exercise a large amount of influence over how public policy is actually carried out. When local government officials are removed from the administrative process and the daily exercise of policy implementation the demands on middle management will increase.

The challenge was initially managed by conducting an in-depth analysis of the legal issues of providing different solutions to open social e-services and then to request a formal decision by the Social Services Committee on which solution to choose.

Technological Incompatibility. The current information system package lacks workflow capabilities. It is built on a database using forms to create, read and update information. The only means to signal hand-over between roles in the organization are changes in case status. This means that it is difficult to build on this application when integrating the administrative process further.

The challenge was managed by letting the IT-supplier conduct a pre-study of how to communicate with the e-service front-end (My Pages) and to implement changes necessary to realize the to-be process. If the criteria could be handled separately and disconnected from the web form and the decision logic in the workflow then the e-service would be more or less transparent to all application processes in most municipalities.

Lock-in Relationship with IT-suppliers. The current information system used by the Social Services Committee, Procapita, is built using a two-tier technical architecture: database and application. The database is owned by the municipality of Järfälla but the operations and maintenance is outsourced to the IT-supplier that owns the application Procapita. The agreement between Järfälla and the IT-supplier does not allow for other applications to create or update data. Also, it is not allowed to change the structure of the database. This has the effect that IT-related changes have to involve the IT-supplier which is costly and often time consuming. Even small changes can be very difficult to realize.

To manage this challenge, the project has tried to involve the IT-supplier in the development process. Since Procapita is an information system used by a majority of Swedish municipalities, the support for open social e-services may potentially be used by a large number of municipalities.

5. Epilogue

In this paper we set forth to design an "Open Social e-Service" for assisted living services. The administrative process for the emergency help telephone in the municipality of Järfälla was analyzed and redesigned. Several best practices for process innovation were used to relocate control towards the citizen and to eliminate tasks and manual work in the current administrative process. The design was demonstrated in a YAWL-prototype. Potential benefits were analyzed from the

perspective of the municipality and the service provider. Challenges experienced during the work were reported and analyzed.

We conclude that a major challenge with open social e-services is the transition from the current way of how control is exercised by the local government officials within the Social Services Committee to a new way of how control is shared by citizens and middle management within the Social Services Committee. We also conclude that for the open e-service to be applicable to other domains and municipalities, it is important to manage decision criteria separately. Hence, a second design iteration should consider separation of concerns [27].

The service is currently under implementation and will be evaluated through tests and analysis of actual benefits achieved. Verification, acceptance and usability tests are planned for second half of 2010. Benefit analysis are planned to be carried out in 2011 using an approach combining Peng and Value modeling [28, 29].

Acknowledgements

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