STRUCTURED APPROACH FOR THE INTRODUCTION OF INFORMATION SERVICES INTO THE PRIVATE SOCIAL SOLIDARITY INSTITUTIONS

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Abstract: The paper presents an overview of a Reference Information Model for the introduction of information services into the social solidarity institutions. The model is based on a complete description of the different institutional process, from a high level to a deep detail perspective, and was used for the implementation of a Client Management Information Service for Private Social Solidarity Institutions.

1 INTRODUCTION

In the presence of the pressures and challenges placed on the welfare structures it is urgent to optimise the available resources. In Portugal, the welfare public services represent only a small part of the social support that is given to the citizens. The Private Social Solidarity Institutions (PSSI) play a very important role to fulfil the gaps of the public services, since they are the ones that give most of the support and are closed to the society.

According to the Law nº 119/83 of 25 of February (PSSI statutes), the PSSI "are non-profit and non-public institutions which main purpose is to provide social support to necessitous persons but also to promote education and prevention of diseases".

The government recognises the relevance of PSSI in the provision of social services to the population threw the establishment of cooperation and financial agreements. In fact, the family support has been decreasing and the public welfare agencies consider the PSSI a strategic part in the care system. They provide a number of social services, namely domiciliary support or health care.

In many PSSI it is possible to evidence that care providers are involved in repetitive administrative tasks. Such tasks can be supported by technological solutions so that more time could be left for the clients. The present situation is particularly inadequate because, on one hand, the cost of the human resources consumes a great part of the PSSI

budgets and, on the other hand, the actual paradigms promote an easy access to the existing resources and the knowledge sharing wherever and whenever necessary. It must also be pointed out that in care providing the multidisciplinary teamwork involving different service providers has an extreme importance, but the relationship between the different entities is not always trouble-free, contributing decisively to the reduction of productivity.

Therefore, the systematic use of Information Technologies (IT) in the communication, management, processing, availability and exchange of information between PSSI, citizens and social agents must be stimulated. A clear desire is the development of citizen centred services using new organizational frameworks that integrate heterogeneous compilations of resources to be acceded as a uniform conglomeration of information and knowledge. This need elapses from the care providers' own action. Assuming that they must be information managers, IT must be used to introduce more objectivity on the different social tasks. However, it is important that the technological introduction might be done in a sustainable way and not supported by a set of unframed projects.

2 OBJECTIVES

The present paper reflects the results of a research work that intends to contribute to the development

of methodologies that will help the technological evolution of the PSSI. The main issue is to evaluate if a conceptual framework for the PSSI essential information can facilitate the introduction of IT services and promote the participation of the PSSI collaborators in the different phases of the required reorganization procedures.

A regional project within the Programme Aveiro - Digital (Rocha, 2002) is being used to validate the outcomes of the research effort. Therefore, it is possible to take benefit from a regional perspective, since a sustainable development has more chances of success when it is geographically located and when there is the opportunity of repeating experiences. It is also advisable not to forget that the regional dimension is fundamental in the conception and implementation of policies since it is at the base level that the relationships are more easily handled.

The next section provides a short description of the constraints related with the improvements of the PSSI organizational procedures. The fourth section presents a Reference Information Model for the PSSI information services. The fifth section describes the Electronic Social Record, a main element to model the PSSI essential information. The sixth section contains a presentation of the experience gained in a regional project involved several PSSI (which provide support services to elderly and disabled people) and public welfare agencies. Finally, an outlook on the results is provided in the seventh section.

3 THE PSSI SITUATION

The technological evolution of the Portuguese PSSI is somewhat precarious. A study done for the PSSI of the Aveiro region (Souza, 2004) shows that almost all the inquired PSSI have several computers, though the connections to a network are almost inexistent. The Microsoft Office is quite spread and some PSSI also make use of applications for administrative purposes, mostly not integrated. There is not any specific software for the management of the clients' information (in all the studied institutions, the clients' records are based on paper).

Concerning to the communication itself, the most used means of communication are: the telephone (in the communication with the exterior), telephone, paper and personal contact (in the communication inside the PSSI) and the meetings (in what concerns to communication in a teamwork context). The

electronic mail is already available in most of the PSSI, but it is not much used.

Regarding to the investment priorities and its short-run planning, in spite of the great majority of the inquired PSSI consider that the existing computers are insufficient, a significant number of them have a clear intention to invest more in the connection of the computers to a network. They also consider that it would be useful to invest in integrated applications, and a few reveal the intention of doing it in a short run.

It is important to mention that there is not, in none of the considered PSSI, anyone responsible for the information systems. There are, in the majority of the cases, administrative personnel and even social workers that give some technical support.

Finally, in terms of acquisition and adoption of IT based solutions, the PSSI are aware of the importance of people's training, formalization of tasks, standardization of procedures and integration of information. It is still important to mention that it is implicit the need that the information which is currently scattered by several institutions, centres and professional fields, should correspond to a one single and coherent body.

However, this evolution strikes against a diversified set of barriers, namely the lack of the financial resources, the collaborators low level of schooling and reduced experience in use of IT, resistance to change, collaborators expertise directed towards the necessity of running the daily problems and not available for planning and realising advanced organisational and technological innovations, the level of complexity apprehended by PSSI collaborators regarding technology, poor formalization of the tasks, lack of standardized procedures, low level of integration of the existing systems and some lack of recognition of the importance of technology.

In reference to eventual facilitators to the introduction of IT based services, some factors can be named, namely, the experience resulting from several projects, a slight change on the PSSI collaborators' attitude (starting to show more predisposition to work using IT and showing also a higher recognition of its usefulness), the positive way of facing the deepening of the PSSI collaborators' knowledge, the appearance of younger professionals who are more receptive and qualified to use this kind of tools and the level of increasing importance which is given to the technology acquisition.

At the time being Portugal presents a fast introduction of IT in the public welfare agencies,

within the modernization of the public administration. This puts a considerable political pressure to the PSSI. Furthermore, due to several modifications of the social and healthcare political frameworks, the PSSI are being pressed to evolve for a new perspective of care providing with an efficient cooperation between social and health services.

This evolution has been very difficult to achieve due to several causes, namely, the fragmentation of social and health services, the reduced degree of decentralization of the policies in the country, the low level of allotment of resources between social and health systems, the importance of the power for the professionals, the hermetic characteristics of the health entities, the prejudices among professionals, the discrimination regarding certain groups of collaborators, the professionals and institutions fear of being evaluated and even aspects such as the high level of individualism of the society.

In fact, the fragmented supply of the care providing is a real problem in the existing social and health systems, which contributes to the inefficiency of the services and to low quality standards in the care provision. However, an integrated perspective of the care providing (Kodner, 2002) needs the creation of multidisciplinary teams (horizontal integration) in the same level of care or the linkage between different levels: primary, secondary and tertiary care (vertical integration). In this process, the goals, the skills and the roles of each part must be clarified and the IT solutions must be used to create virtual organizations, formally separated, but allowing the information sharing and the teamwork.

4 REFERENCE INFORMATION MODEL

The PSSI are short of good practices in the introduction of IT and in the development of protocols and guidelines for care providing. A specific methodology, the Best Institution Practice (BIP), was developed to respond to this need. It is based on a set of principles or good practices and it is focused on the organizational processes and on the optimisation of activities inherent to the teamwork, within a PSSI and between different PSSI (Rocha, 2005).

Another important component is the Reference Information Model. Usually, a PSSI is composed by a set of autonomous services that can be geographically distributed and with different levels

of complexity. Due to this distributed nature, monolithic IT applications can hardly be adapted to the requirements of the PSSI. On the other hand, a distributed architecture presents several advantages, since it allows the most adequate technological solution for each unit that compose an organization of this type. However, the specific characteristics of the care providing can lead, in technological terms, to a great number of different and heterogeneous applications, conceived to satisfy the requirements of particular users and most probably not compatible among them.

Therefore, it is important to guarantee the evolution, integration and interoperability between a set of different and heterogeneous applications that can be developed at different moments by different suppliers with different technologies but, logically, are part of the same information service.

It should be pointed that the available technology allows in an easy way the interconnection of distributed applications, even if they are heterogeneous and part of different physical systems. However, this type of interconnection is only related with technical aspects and do not provide the applications interoperability in terms of information consistency, which is the important issue for the final users. Furthermore, is not enough a simple messages exchange for the cooperation between different applications, inasmuch as this solution only allows a relative interoperability, without a real integrated organizational perspective.

The establishment of common information models, able to relate the different types of data available to all the applications required for the information services, can promote real information integration. The main concept behind such model is that, independently of its characteristics and goals, a PSSI can be considered as a set of users, individually different and carrying out very specific tasks, but all of them needing to share a common and reliable infrastructure of basic information. This common information structure cannot belong to a particular application, but must be accessible to all applications through public and well-defined interfaces, which do not have to depend on any technical characteristic of a particular system configuration.

For this, a reference model is required. The Reference Information Model guarantees a common conception of the information that is transferred, which cannot be defined without having a common vision of processes, procedures and concepts, despite the differences that, necessarily, exist between the PSSI. Such approach makes possible

the generalization of common functions and the specification of specific functions for each particular social service. The base for the development of the Reference Information Model was the correct description of the different processes, from a high level to a deep detail perspective. Considering the heterogeneity of the PSSI, the processes are similar up to certain level (even so can be different), but when a greater detail is incorporated, the processes necessarily will be different, partially due to the local procedures and rules.

5 ELECTRONIC SOCIAL RECORD

In order to guarantee the interoperability between different applications it is essential to define a way to structure the essential information of the PSSI. On possible way is to consider a nuclear group the data regarding the clients (including not only their characteristics and needs, but also the results of the different activities centred in them). By analogy with what happens in the health domain (Beale, 2001) we assigned this nuclear group of data as an Electronic Social Record (ESR). The conceptual framework of the electronic support for the clients' records is a fundamental tool and it allows (Himss, 2004) the improvement of the quality, security and efficiency of care providing, emphasizes the client centred care, improves the prevention, reduces the information redundancy, facilitates the information sharing among institutions (because it can be consulted starting from any point by properly authorized users) and reduces the probability of errors in adverse situations, through the access to the complete client record and the use of decision support systems.

The conceptual framework of the ESR is derived from the paper based client record, which is used by most of the PSSI, but that presents some difficulties, namely, incapacity to access the clients' global data (many times scattered by several care providers), inadequate forms of archiving, data supports that can be damaged by handling, difficulties in updating the data, impossibility to guarantee privacy, among others.

A client can be described through several concepts, because it assumes several roles throughout the life cycle. For the PSSI, the client visibility starts with the registration, can continue with an individual care plan until the interaction with the PSSI ends. Once more, the fact that some data is defined by an activity that occurs explicitly outside of the PSSI should be valued. In fact, some data can be received from external centres as a result of external processes and represents autonomous and self-consistent information only related to the client.

The definition of the ESR architecture considers that it should support information services that are essential for the care providing, reflecting on different organizational levels and different types of processes, namely in respect to processing of client data, such as, observation, reasoning and intention. The information that supports the various activities and processes can be more or less complex, constitute a more or less significant part of the potential set of all the necessary data for the functioning of a PSSI. In the scope of an information system to the care providing, the ESR is responsible to support the applications for the clients' management and must contain all data that is necessary to assure the consistency of care providing. Therefore, the information model must allow the retrieve of the social and clinical history of the client, as well as all the relevant moments of interaction.

The development approach that was followed was to separate the information semantics and knowledge into two different levels: the information model and the knowledge model.

The information model is a generic one, in order to be able to embraces all type of information necessary to record the client's information, but also adjustable to answer to the requirements of each service in what concerns to the access to the information. It contains only non-volatile concepts in order to be maintainable, and it is the fundamental model for the software engineers to perform the technical implementation of the information systems.

The main components of ESR model allow answering to six basic questions linked to each record: what, when, where, who, why and how. Therefore, it is composed by four basics elements (see the high level diagram of the Figure 1): transaction, entry, collection and item. The ESR is composed by several versioned transactions, which can contain one or more entries of different types: observation, assessment or instruction. The information contained in an entry is grouped in collections. The collections are constituted by items, which correspond to the elementary units of information. Furthermore, the transaction must be capable to reflect the context (who validated the inserted information and why it was inserted) and the collection must reflect the procedural context
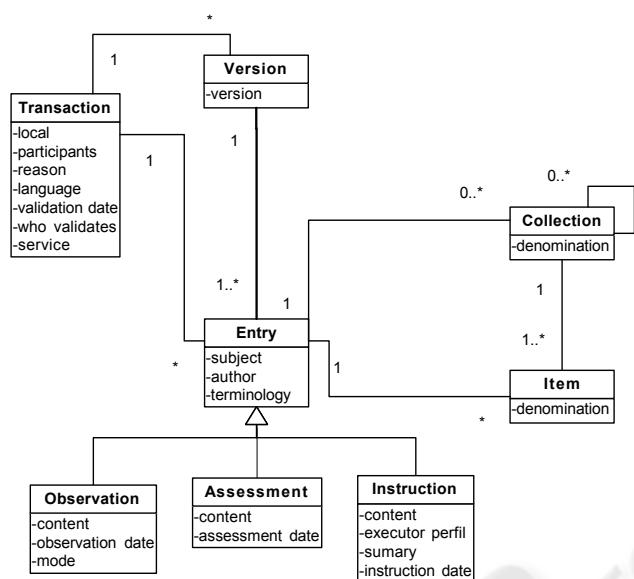
Figure 1: Main Components of the ESR information model.

and time, where the information was created, as well who is the author of the information.

The presented structure is a generic one (prepared to suffer evolutions, whether they are technological or organizational structure) that allow to store all information about the clients, without however to be compulsive the use of all the data for all the services or institutions. Therefore, it is necessary to define a set of different models that organize the information according to the different services or the needs of the different care providers. This corresponds to a second level of abstraction (the knowledge model) where the numerous, volatile concepts of most domains are expressed.

The knowledge model adjusts the information model to the needs of each PSSI, service or care provider in what concerns to the information that should be part of the client record and to the forms of accessing this information. For that it is necessary to define archetypes that are distinct domain entities that express constraints on instances of the underlying information model (Beale, 2001). In the followed approach, archetypes are instances in an object oriented system implementation, which means they can be created and manipulated by graphical user interface tools, alter as desired without changing the underlying information system technical specifications.

The main advantage of the followed approach is that software engineers develop the technical models, while a phased approach with an active involvement of the PSSI collaborators is used to develop the concepts of the knowledge model.

Therefore, the final users are empowered to directly produce artefacts to control how their system will function.

This technical approach allows the introduction of a new information service in an incremental way, being the PSSI collaborators the ones who define the relevant information to maintain in the system, how the user interfaces should behave, what are the suitable forms for accessing the information and how the care providing process should be organized.

6 EVALUATION

Due to the opportunities and challenges of the development of the information society it is urgent to find the best practical ways for that development. The Programme Aveiro - Digital (Rocha, 2002) attempts to respond to this important challenge through the search for better ways to the development and introduction of IT solutions in a region scale as well as by showing evidence of the advantages they can provide. The making of the Aveiro - Digital has been accomplished more on the basis of a radical transformation of the habits and behaviour of the citizens and institutions, rather than just providing it with the necessary infrastructures and systems. Therefore, the Aveiro - Digital represents an opportunity and an ideal scenario to evaluate the developed tools and models. The Information Services for the Social Solidarity Institutions, a three years project of the Programme Aveiro - Digital that congregates a representative

group of PSSI and public welfare agencies, has been selected for this evaluation.

Therefore, the ESR was part of a Client Management Information Service that allows the care providers to have a distributed access to the information about the clients.

The underlying information systems follow a multi-layer architecture. At the presentation level, different interfaces may exist according to final user's preferences, needs and terminal equipment that are being used. This corresponds to an abstraction layer that comprises all the communication between the system and the users, with their profiles stored in the system. The profiles can determine how the interface to a given user is presented. This approach has been easily implemented due to XML technologies.

Several archetypes were developed and they were included in a concept layer that is used to access the ESR. The ESR belongs to a middleware layer that presents other common functions such as a person identification service or security related functions (namely, authentication of the identity of the user that is requesting an information access or the basic mechanisms describing the users authorised to access the system and the functions they are able to perform).

From the engineering point of view, the web services technologies were selected for the implementation of various components. This system architecture is technologically neutral, guarantees the interoperability with standardized solutions and allows the integration of software components from different sources.

7 CONCLUSIONS

Within the Aveiro - Digital a structured approach has been followed to capture heterogeneous users' requirements, to define complex technical specifications, to help the systematisation of broad range of concepts of the social care domain and to facilitate the reorganization of internal procedures of several PSSI. The main result was the establishment of new practices, namely those related to the record of the performed activities (almost inexistent before). The developed Client Management Information Service allowed a continuous record of the performed activities and had motivated the standardization of procedures for the accomplishment of certain actions or interventions.

Furthermore, the implementation approach of having a generic information model for the ESR that

can be customize by defining the appropriate knowledge model (archetypes) allows the generalization of the information systems (the same implementation has been introduced in different PSSI, although different archetypes were defined).

The experience gained shows a high level of acceptance by the involved PSSI. Among others, the reasons for the acceptance are related with the structured approach, namely the existence of reference models and a set of comprehensible tools that facilitates the involvement of the PSSI collaborators.

At this moment, the aim is to identify a set of performance indicators in order to quantify the profits and to measure the return of the investment in terms of benefits that contribute to the PSSI objectives.

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