Portuguese Participation in the INSIDE Project

Pedro Gravanita, José Alberto Rafael, Nelson Pacheco da Rocha

***Resumo* – Este artigo descreve o resultado da participação do INESC/Universidade de Aveiro no projecto INSIDE do programa Europeu TIDE. O projecto INSIDE teve por objectivo o desenvolvimento de um sistema integrado de informação para apoio à população idosa.**

***Abstract* – This paper describes the participation of INESC/Universidade de Aveiro in the INSIDE project within the European TIDE programme. The main goal of the INSIDE project was to provide an integrated information delivery system to support elderly people.**

I. INTRODUCTION

Obtain correct information can be considered the first step to get out from potentially dangerous, invalidating or discriminating situations in current day life. It is obvious that lack of information can be a very real barrier to receive services and benefits. People may be unaware that services are available, they may be uninformed about their eligibility for benefits, and they may be confused about which agency provides which service. Furthermore, lack of co-ordination among the existing health and social services and fragmentation of the existing information services are responsible for the lack of synergy between the demand and the offering sides.

INSIDE (Integrated NetSystem for Infoservice to Disabled and Elderly) was a project within the TIDE (Technologies Initiatives for Disabled and Elderly) programme that aimed to explore the information and communications technologies to fill the gap between amount of knowledge and its effective use in daily practice. The general objective of the INSIDE project was to provide an integrated information delivery service to elderly people through the use of an intelligent system to access health care and social related relevant information (legal, insurance, taxes, cultural, etc.), distributed among various structured and unstructured data banks.

This paper describes the contribution of INESC/Universidade de Aveiro to the INSIDE consortium, which consisted in a engineering effort to translate into logical structures and procedures the data and the information flows issued from a human professional operator to answer specific user queries and needs. The INESC/Universidade de Aveiro team has contributed to the definition of the system requirements, the specification of an intelligent routing framework, and the design of the security mechanisms. Furthermore, INESC/Universidade de Aveiro has also implemented two specific software packages, the Data Management Tool and the Statistical Tool.

II. SYSTEM REQUIREMENTS

INSIDE users are both elderly people and professionals inquiring for specific information. User access is provided through telephone calls to professional operators, responsible for receiving, identifying and processing the request (Figure 1).

The innovative aspect of INSIDE lies in the availability of an InfoCenter with a unique, user oriented interface, which is an access point to a large range of "sensitive" information. The effective availability of the requested information, through the access to the system, contributes to the improvement of the quality of life and welfare of the large population of elderly people.

The InfoCenter is made of: a structured knowledge conceived as a relational database management system (RDBMS) for the retrieval of the information from local and remote data banks, and a number of operator terminals, accepting and processing telephone requests from users.

The RDBMS tables of the InfoCenter contains a map of the existing service providers and related information, namely, territorial competence, supplied services, access modalities, potentiality per service provided (ie, number of beds, personnel, transportation facilities, technological supports, etc.), institutional, private or mixed service path in which is included, types of benefits the client may access, links to specialised centres of excellence at the National and European levels.

On the basis of the aforementioned structured knowledge, the InfoCenter is able to provide "intelligent routing", which is explained by the following actions:

- To direct the clients to the service path most suitable for satisfying their specific needs.
- To support the clients with all the useful information to make easier their access to the service.

The system favours the final users to exercise choice in the care services they receive, both at the community and residential level. Therefore, the InfoCenter is suitable to:

- Inform the users about the degree of efficiency and quality of the services offered by the health and social structures of their territory, especially by considering the comparison with reference structures.

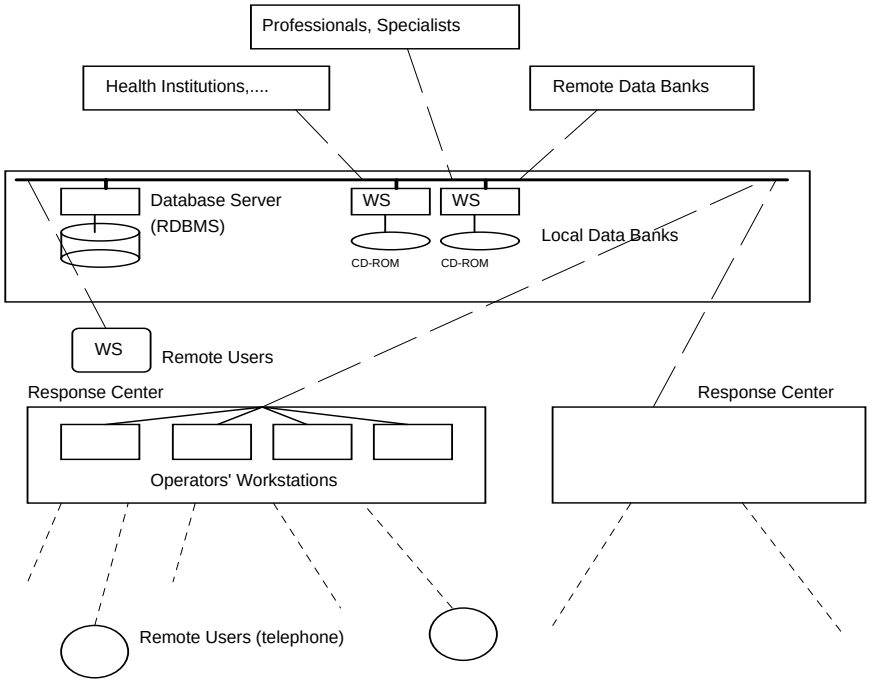

Figure 1 – System Architecture

- Inform the users about their rights and their duties in the health and social systems, by considering the national laws and local regulations.
- Inform the users about the spectrum of all of the possible forms of economical facilities, funds and insurance packages, specialised visits, prosthesis, rehabilitation programs, residential home care, nursing homes, etc.

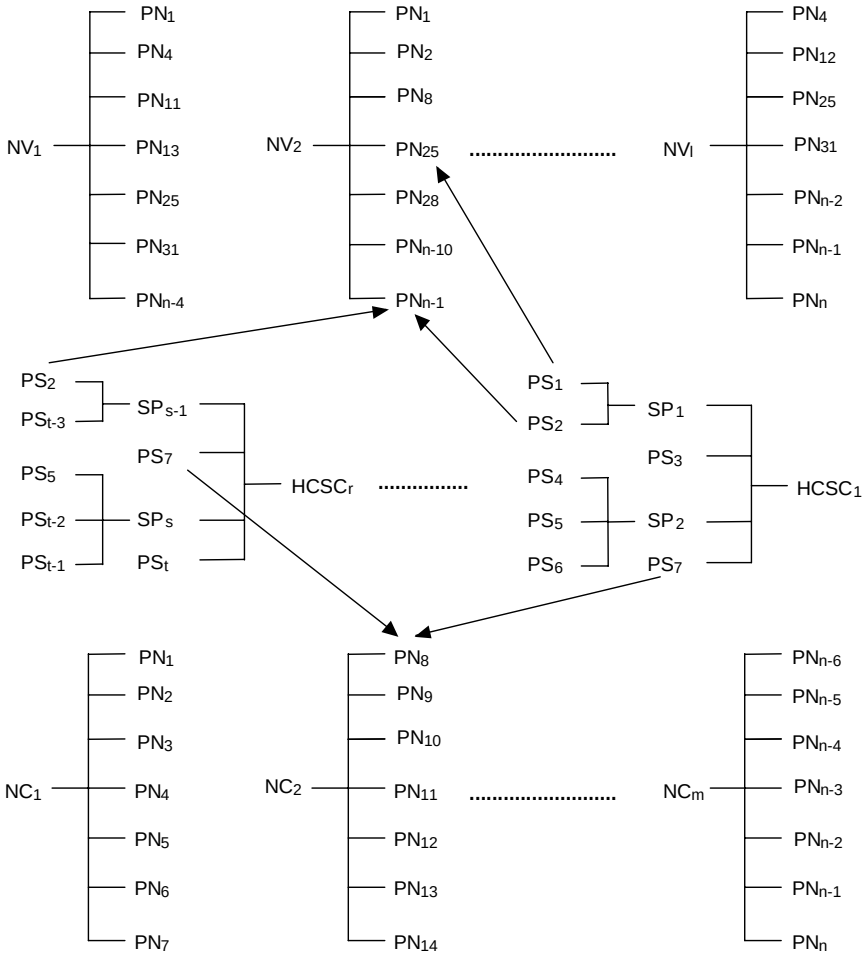

Figure 2 – Example of needs and services sets and of relationships between such sets

- Promote neutrality and equity principles in such a way that may be clearly recognised by the users.

III. INTELLIGENT ROUTING

Considering both the above conceptual starting point and the results of the user requirements analysis [1], the way the INSIDE consortium adopted to design an intelligent routing mechanisms was the following. First of all, some macro-categories of the user needs were identified in order to fix a basic framework; then, specific aspects of the user's needs were analysed by considering them separated into social aspects and health aspects.

Five macro-categories of user's needs have been identified:

- Sensory deprivation – This category relates to the hearing, sight and speech faculties of the elderly person; they are a main area of deterioration, which has an immediate impact on the elderly person's ability to function as a full citizen.
- Dementia – Mental deficiency can occur at any age and may occur to an otherwise healthy elderly person; it impacts not only on the affected person but also very severely on the immediate family who will normally be the first carers outside those of the professional health and social care workers.
- Structure – This category includes skeletal problems (related with the elderly person ability to move around within their home environment and also outside their home environment), and heart failure, which is the most obvious life threatening with impact on the person psychologically and that may lead to a withdrawal from social activities.
- Social needs - This category has a direct effect on the elderly perception of their potential quality of life and where the need for access to information is a major aspect.
- Architectural barriers - A fundamental category of elderly's and disabled's needs is related to the architectural barriers existing in the environment around them.

From the results described in the previous paragraphs, it was possible to proceed with the formal definition of the information elements and respective relations [2, 3].

The basic information element is the primary need. The primary need is a specific need, for which it is not possible or meaningful for the objectives of the informative system to proceed with further sub-classification of the need itself. However, primary needs can be grouped into a need category, which is a set of primary needs with some common feature. Furthermore, a primary need can also be grouped into a need cluster, which ia a set of primary needs that can be group together according to some criteria.

On the other end, the users have access to a primary need service (the final service delivered to the user). Each primary need service can be delivered by one or more service provider (the ward or unit of a health care or social service centre, delivering a primary need service) that are related to the health care or social centre (the institution delivering directly the primary need service or the institution owner of the unit acting as a service provider).

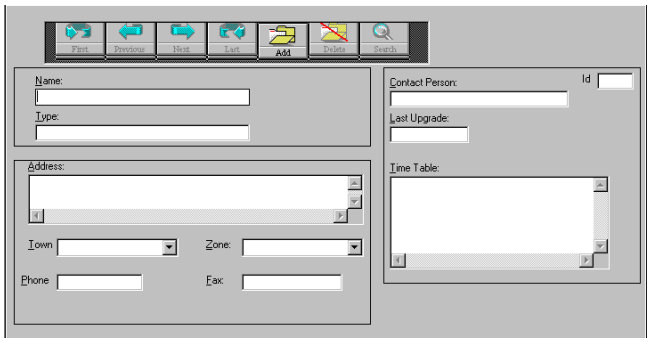

Figure 3 - Service Provider form

One example of the classification and relations between the needs (demand) and the services (offer) is represented as in Figure 2. Need categories (NC) and need clusters (NV) are used to group related primary needs. It can be noted that the same primary service can be delivered by distinct service providers (SP) of different health care or social centres (HCSC); for example, the health care centre "hospital" and "private clinic" can deliver the same primary service "intra-muscular injection".

Once the classification and the relations (roots) have been established the operator can navigate along the information contained in the InfoCenter. The classification sets and the routes are predefined using a specific software package: the Data Management Tool.

IV. DATA MANAGEMENT TOOL

The Operator User Interface was developed by Polytechnic University of Madrid and its description is presented in [4]. On the other end, INESC/Universidade de Aveiro was responsible to implement the Data Management Tool [4]. This tool can be used to add to the database a particular instance of any of the information elements defined in the information model and with a structure that follows the hierarchical approach of the

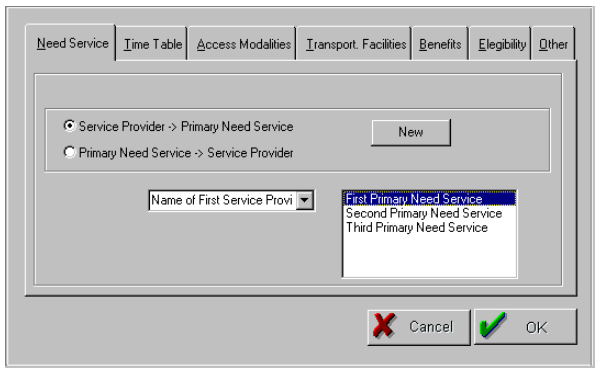

Figure 4 – Form to relate each primary need service and respective service providers

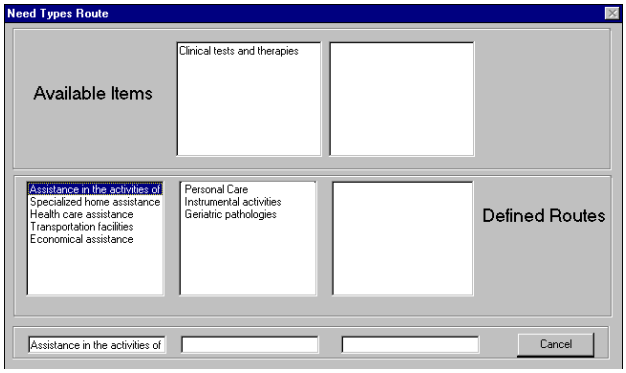

Figure 5 – Specification of the navigation routes

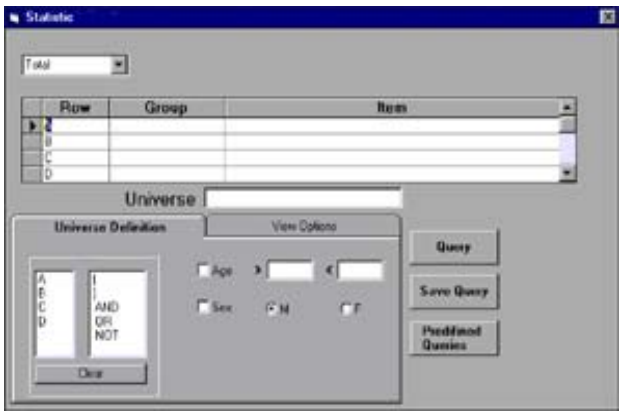

Figure 6 – Statistical Tool main form

same model. Figure 3 presents the form to introduce a new service provider.

The Data Management Tool allows to map each primary need service with the respective service providers (Figure 4) including the specification of a set of attributes, namely the time table, access modalities, transport facilities, benefits and eligibility. Furthermore, using the Data Management Tool, a need category can be related with a primary need (Figure 5), a need cluster can be related with a primary need and, finally, a primary need can be related with a type of service.

V. Statistical Tool

The interface of the InfoCenter to the professionals of the health and social services emphasises the viewpoint of synergy enhancing between the demand and offering sides. By storing the user's queries in a structured way, especially by using a logical framework which may be suggested by the professional themselves, the InfoCenter may become a powerful mean for knowing in real time the evolution of the user's needs. Thus, the InfoCenter may be queried by the professionals of the health and social services in order to get information and indications useful for finding out the most suitable corrective actions to the services under their responsibility. The Statistical Tool allows that information may be extracted from the database of the user's queries with regard to:

- Statistics on the status of the population of elderly (health, social, economical, etc.).
- Indicators of the degree of satisfaction/unsatisfaction of the users with respect to the services (from which measures of the gap between what is expected by the elderly and what is provided them can be derived).
- Indicators of the risk area within the territory (health emergency areas, social emergency areas, deprivation zones, etc.).

The interface of the Statistical Tool (Figure 6) has a main form that allows the selection of the type of question, the definition of the universe of clients and the activation of the queries.

In terms of questions there are options that allow answers to the following three main types of questions: "How many...?"; "What is the Average...?"; and "What is the percentage of...?".

The universe of all clients can be restricted to a sub-universe. For example, clients from group A that are not in group B nor C and have ages between 50-60. Furthermore, the operator can select how he/she wants to see the requested information, namely the way data should be grouped and what group should be transposed.

In terms of queries, there is a form that allows the creation of a new query or a selection of a previously saved query. If a query is valid it triggers a form with the results (Grid View). An example of this Grid View is represented in Figure 7. Here, the information is grouped by sex and transposed by age groups. The information can also be presented in a graphical way (Figure 8).

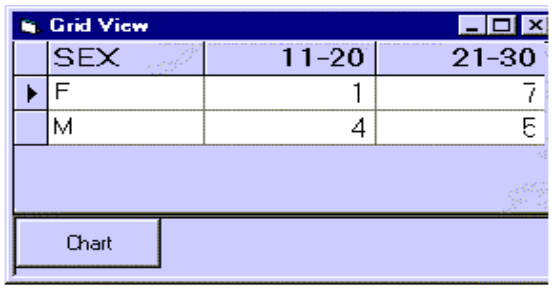

Figure 7 – Grid View

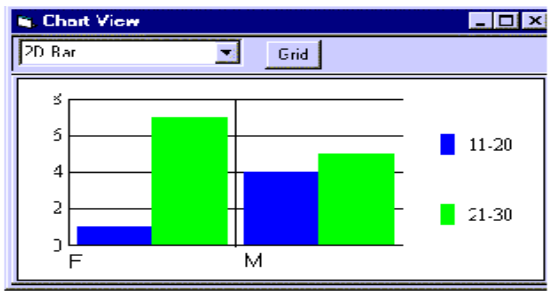

Figure 8 – Chart View

VI. Security Mechanisms

The access control of the InfoCenter information is based on the security capabilities of the DBMS used to support the database. This option frees each client application from knowing the security rules as well as maintaining them. Therefore, each client application can be maintain

as simple as possible and, simultaneously, all clients have an equivalent degree of security. Moreover, since the DBMS facilities are used to implement the access security mechanisms, it is possible, with less effort, to achieve a high adaptable security system: since the security base level is located in the server it is possible to use the same client application for different kind of users, with different user profiles.

The security mechanism that has been designed uses two user levels: the InfoCenter administrator level and the normal user level. Each user is characterised by the system as having a particular user profile, which determines his capabilities to interact with the InfoCenter database. So each user is associated to a role which is defined by all the read/write permission's to access the overall tables that constitutes the system database. The InfoCenter administrator, beyond the capabilities of normal users, may access the InfoCenter tables, and has the capability to create users, roles and associate them with each other.

In terms of implementation:

- Each user is identified by the DBMS with a different login and password;
- The InfoCenter administrator owns all the InfoCenter tables maintained by the DBMS;
- Normal users just own views that reference the InfoCenter tables according to the permission's defined by the InfoCenter administrator for that user. Permissions are grouped into roles, which are associated with a user by the InfoCenter administrator.

Access conditioning definitions are maintained by a special application to be owned by the InfoCenter administrator, which uses DBMS specific features to implement security.

VII. CONCLUSION

This paper has presented the INESC/Universidade de Aveiro contribution for an integrated information delivery service to elderly people (InfoCenter) developed within the INSIDE consortium. The InfoCenter has been submitted to a test bed run, which included all the activities related to the effective set-up, start-up and use of the system prototype, and also user, social and market evaluation.

The test bed run took place in Genoa (Italy) and Belfast (Ireland). The evaluation results [5] show that the prototype can constitute a first step platform potentially applicable to a much wider scope in the interest of the European citizens.

VIII. REFERENCES

[1] "Scenario Description and User Requirements Definition", Inside Deliverable D1, 1995.

[2] "Service Functional Specification", Inside Deliverable D2, 1996.

[3] "System Architecture Design", Inside Deliverable D3, 1996.

[4] "Final Software Release", Inside Deliverable D4, 1997.

[5] "Overall System Evaluation", Inside Deliverable D6, 1997.