

# Tele-assistance integrated services

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**Rezumat.** Dezvoltarea și diversificarea serviciilor electronice, strâns legate de dezvoltarea exponențială a tehnologiilor informatice și de comunicații - TIC, conduc la schimbări fundamentale și în domeniul activităților de asistență. Serviciile electronice permit cetățenilor accesul continuu la sursele de informații publice, precum și schimbarea conceptului și organizarea multor servicii tradiționale sau externalizarea unora, cu consecințe economice pozitive. Serviciile integrate de teleasistență – SiTa reprezintă un exemplu tipic de servicii electronice, cu o dezvoltare și diversificare permanentă. Dezvoltarea viitoare a SiTa depinde de schimbarea stilului de abordare și anume de la orientarea către tehnologie la orientarea către cerințele utilizatorilor, în acest mod asigurându-se, mai eficient, satisfacerea cerințelor individuale ale beneficiarului de servicii de teleasistență. Lucrarea prezintă unele aspecte referitoare la caracteristicile SiTa, suportul tehnic necesar și tendințele viitoare în concordanță cu cerințele societății.

**Cuvinte cheie:** teleasistență, telemedicină, servicii integrate, suport de comunicații, suport informatic.

**Abstract.** The development and diversification of the electronic services, closely related to the exponential development of communication and information technologies - ICT, lead to fundamental change in the field of service activities. The electronic services allow continuous access of the citizen to public sources of information, changing the concept of organization of many traditional services or outsourcing them with positive economic consequences. The Tele-assistance Integrated Services – TISr are representing a typical example of electronic services, developing and diversifying permanently based on innovation and collaboration. The future development of TISr depends on changing the style of approach from technology orientation to the users requirements orientation, in this way ensuring, more efficiently, satisfying the requirements of the individual beneficiary of tele-assistance services. The paper presents some aspect relating to TISr's features, required technical support and the future trends according to the society requirements.

**Keywords:** tele-assistance, telemedicine, integrated services, communications support, informatics support.

## I. INTRODUCTION

Today, electronic services provide a very useful tool for optimizing activities in various fields. The development and diversification of the electronic services, closely related to the exponential development

of communication and information technologies – ICT, lead to fundamental change in the field of service activities through the collaboration of all participants. The electronic services allow continuous access of the citizen to public sources of information, changing the concept of organization of many traditional services or outsourcing them with positive economic consequences. The electronic ser-

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vices development requires, also, continue innovation activity, in order to enable a permanent adaptation to the requirements of suppliers and end-users of these services, as well as collaboration between various sectors or between specialists of different activity areas, much closer than in the case of many services.

The success of implementing electronic services depends on changing the style of approach *from technology orientation to the users requirements orientation*, in this way ensuring, more efficiently, satisfying the requirements of the individual beneficiary of electronic services.

This change of approach, focused on user-orientation, represents a tool for improving and increasing innovation in the development of electronic services, having as elements:

- context-focused target;
- social factors: the economic and social premises and the elements which are related to the human behavior, cultural issues etc. ;
- organizational factors: data and information sharing, the integrated services in order to ensure their customization according to user individual needs, etc

The *tele-assistance integrated services* - TISr are representing a typical example of electronic services, developing and diversifying permanently based on innovation and collaboration.

The paper presents some aspect relating to TISr's features, required technical support and the future trends according to the society requirements. [10]

## II. METODS

The *tele-assistance integrated services*, represents the totality of the organizational, administrative, technical, and economic activities, in order to provide assistance services for people, basically at their homes, based on a platform containing devices and

equipment – connected through communication systems, and custom software applications.

In the various studies and forecasts are showing that the Europe's population is ageing. The average life expectancy has increased from 55 in 1920 to over 80 years now. With the retiring of *baby boom* generation, the number of persons between 65 and 80 years old will increase by approximately 40% between 2010 and 2030.

Older people are more likely (than younger age groups) to suffer multiple health conditions, chronic physical diseases and mobility limitation, often with concurrent mental and cognitive disorders, all of which requiring constant attention and care. The task of caring for these people is often shared by the family and/or other carers. For those elderly people who choose to remain at home, the distance between them and their carers can become an issue. All these people are unique medical cases, as well as being unique whole persons, with different individual needs that have to be covered, from the highly important aspects of disease prevention and lifestyle management to timely clinical care and follow ups.

In this context, the European Union has mentioned three directions of action [1]:

- a) well aging at working place or extending the working activities;
- b) well aging within the community;
- c) well aging at home.

TISr approaches the aspects of well-ageing in the community and at home, by the need to have an active social life and creative, as well as by accessing public and commercial services, reducing social isolation (one of the major problems of the elderly in rural areas, less populated areas as well as urban areas with limited family support). They can also enable the elderly to enjoy a healthy life and a better quality of daily life for a longer period, and at the same time, the independence, autonomy and dignity.

A *citizen-oriented services paradigm* which responds to the concrete needs of it, becomes the central element for the development of TISr, covering a lot of objectives, as shown in Figure 1.

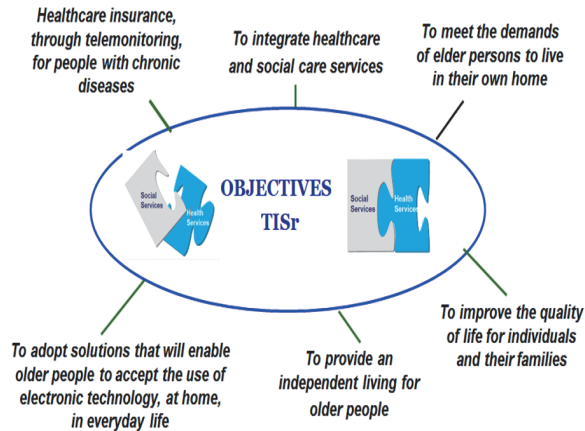


Fig. 1. Objectives covered by the TISr.

In this way:

- improve the quality of life of vulnerable people and the elderly;
- maintain services costs of nursing and social assistance at a low level;
- it supports the care staff, families and care organizations;
- open up new market opportunities for industry and service providers in the medical, technical and social areas.

The integration for TISr refers to the inclusion in the same platform of health telecare services and social telecare (Figure 2), where one can distinguish between devices/systems in the older person's home, the connecting systems, and the systems at the service provider end [2].

The term health telecare is used for delivery of medically-oriented care services to elderly in their homes, that can include a lot of different services or applications like tele-monitoring (blood pressure, blood glucose, ECG), tele-consultations (by videophone, smart phone), or tele-rehabilitation (by videophone).

The term social telecare is used for delivery social alarm services (non-medical services). These service (with various sensors placed in the home) enable an older person to call an alarm center when need, and the alarm center than contact family or formal services.

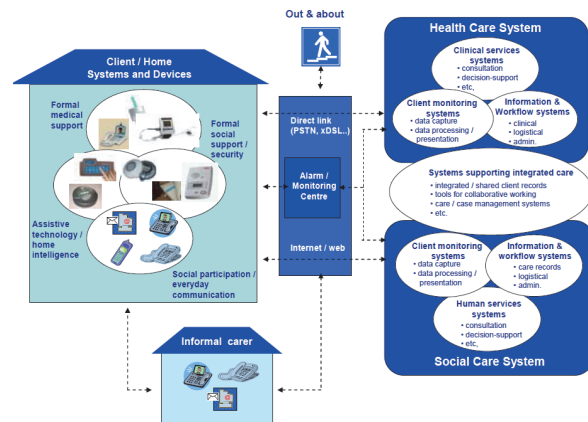


Fig. 1. The integration TISr concept [2].

For the implementation, development and exploitation of the TISr, is necessary to ensure a support made up of the following main components:

- hardware platform;
- software platform;
- communications support;
- organizational framework;
- the legislative framework.

The first three components, which make up the technical support, can be found in a *tele-assistance integrated platform* - TIP.

But, for the purpose of the operation of a TISr is absolute need a *legal framework*, also, allowing the organization of such a service. It must operate in accordance with *medical ethics and the laws in force*, starting from social assistance to the protection of personal data.

These technical and organizational conditions can be fulfilled only by applying the results of the development and technological innovation in the

field of ICT, as well as through a wide cooperation of specialists from the technical, medical, social, legislative, regulators areas.

### III. RESULTS

The Figure 3, depicts the generic architecture for a *tele-assistance integrated platform*.

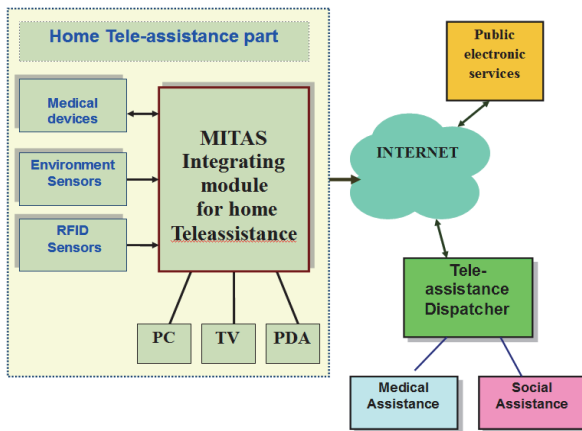


Fig. 3. Generic architecture for a TIP [4].

The tele-assistance platform, based on ITC, is building to offer a complex home services and has the following components:

- The hardware platform, that consists in implementation of a customized telecare module – MITAS (Integrated Module for home Tele-ASsistance), as interface for medical devices or environmental sensors used for telemonitoring, interface with communications help, internet, fix or mobile networks, interface used to deliver information towards beneficiary on PC or PDA or TV, or with tele-assistance dispatcher connected to medical or social assistance centers.

- The software platform that includes all needed software applications for user-interfacing in order to communicate with the system and database storing the users information. Software components support: (1) system logic applications to coordinate activities of the assisting staff and (2) client-customized applications for agenda activities.

- The communication support that provides all TIP components connection, having two main components:
  - ✓ the residence communications network;
  - ✓ the transport communications network providing the link to a tele-assistance center or to other public, commercial or social services.

In recent years, the used devices, both the medical and communications - PDAs, tablets, smart phones, have been subject to a continuous process of innovation, in order to meet the requirements and use skills of the assisted persons, such as [8]:

- small size and light weight for portability;
- medical-oriented appearance for a better recognition;
- open functionality for future development;
- easy-push minimized keyboard;
- friendly operating menu;
- intuitive commands.

The software applications for users-system interaction are continuously developed according to the following issues and challenges:

- The tele-assistance is needed to assist persons with chronically diseases, on the one hand, but, especially for elderly, this requirement is related by the ageing of the population. Are thus required solutions for adaptation to the issues of memory, sight, hearing, mobility, issues that go with the advance in age, the loss of independence.

- Although, at present, many of the elderly have started to communicate with their children in other countries through the Internet and web cameras, whether in rural or urban, however, the percentage of the people over 65years using Internet is still low, and mentioned problems of hearing, or dexterity, make it difficult use of the devices and electronic equipment from tele-assistance platform.

- On the other hand, software applications designed for medical or social assistance staff, must

be adapted to the requirements of interoperability imposed on data collected from miscellaneous users, and classic medical and assistance systems.

**The residence communications network** has many times transformed based on the technological advances, in communication area, to be able to perform medical or environmental data collection. An important role played by wireless technologies that allowed development of a wide range of networks:

- *Wireless Body Area Networks* - WBAN. These are networks located on the human body (e.g. networks of sensors for monitoring of functions of the body, etc.).

- *Personal Wireless Area Networks* - WPAN. They are used for communication between the equipment that usually belong to a single person. WPAN can operate typically up to 10-50 meters. As examples of technologies used for WPAN can be given Bluetooth, UWB, ZigBee

- *Wireless Local Area Network* - WLAN. Network for data transmission used to provide communications between different equipment. The network covering area is relatively small, around 100 meters. It is used for housing connections, for instance between the medical devices and Home Tele-Assistance Integrating Module, using different versions of the devices according to the IEEE 802.11 standards, commercially referred as Wi-Fi.

- *Ambient Wireless Sensor Network* – AWSN, A network with wireless ambient sensors, installed in or around the house, to collect different data providing information on the patient's environment and activities.

**The transport communications network** is based essentially on Internet. The Internet development is a key issue for electronic services deployment. The electronic services moves from the physical to virtual space within the digital framework, where more applications are developed and used for a large

range of devices: smartphones, tablets, PCs, digital radio or high-definition TV. To provide a successful development of TISr, the broadband communication networks support is strongly needed, because these services require a large number of concurrent accesses of a great users number. TISr, also, began using more and more multimedia elements, which make to increase demand for bandwidth offered by network communications support.

Thus, in Europe 2020 Digital Agenda, concerning Internet access provides [3]:

- till 2013 - all Europeans have access to higher Internet speeds of above 30 Mbps;

- till 2020 - 50% or more of European households subscribe to Internet connections above 100 Mbps.

in order to ensure continued development of e-services, in which TISr has an important role.

#### IV. TRENDS AND CONCLUSIONS

The concept of Ambient Assisted Living (AAL) is more and more present related to home care services. An extension to home-care monitoring, in order to provide a better quality of life. In this context, devices and home appliances are made more accessible to persons with special needs using smart devices, intuitive interaction between persons and devices and new technologies and standards[5].

ICT-based solutions have begun to use technology to anticipate the problems of elderly people for a proactive prevention instruments. Also concepts tend toward the establishment of behavioral models using monitoring technologies for the detection of certain movements such as opening certain doors, use water or electric utilities. Such applications have come to be known as *monitoring of Activities of Daily Living -ADL* with the ability to identify risk-generating behaviors. By ADL means 'The things we normally do in daily living including any daily activity we per-

form for self-care (such as feeding ourselves, bathing, dressing, grooming), work, homemaking, and leisure' (Medical definition). For detection and classification of these activities, the home has to be equipped with several sensors.

The wireless communication technologies, Internet broadband access and information technologies enable TISr implementation, within an *ambient intelligence – smart home*, having an impact on the use in the health application area, and more specific in one of it's most important application sub-area: prevention.

Several academic and industrial research projects have developed concepts and technology for smart homes with healthcare plug-ins to provide graphical feedback on behavioral patterns, to monitor residents' health status, to provide reminders of daily activities and to perform assessment of cognitive abilities.

ADL concept applied in an intelligent environment can serve to develop a *Personal Health Systems* for the seamless provision of quality controlled and personalized health services to individuals.

Implementing the TISr is a social necessity as well as an economic opportunity. ICT has great potential for providing solutions, but needs a comprehensive policy support and also the fully understanding of elder people's needs.

The TISr must comply with the interoperability principle: "anytime, anywhere, by anyone which is authorized and in any manner." Development of a "tele"-component for an assistance service, leads to optimization, reducing costs, performing more actions at low price, shifting the cost burden from hospital care to homecare, reducing it.

The TISr are offering elderly users with:

- healthcare private management;
- conformity which improves the responsibility for the personal healthcare;
- new lifestyle quality;
- proficiency of the medical and social assistance.

The implementation of TISr is confronting with real barriers, such as [2]:

- un-conducive reimbursement and incentive systems;
- fragmentation of systems and services;
- un-receptive or underdeveloped regulatory regimes;
- resistance to change and lack of capacity to innovate.

### Acknowledgments

*This work is supported by the project "Increase accessibility of e-service delivery by improving broadband access network architectures, according to e-Romania strategy " at National Communication Research Institute, Bucharest, Romania, project funded by the Ministry of Communications and Information Society within the Research&Development Sectorial Plan.*

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