Aeronautics and Space

Priority 4

D9.2-6 – Healthware Final Publishable Report

Project Name:	**HEALTHWARE**
Project Title:	***Standard and Interoperable satellite solution to deploy health care services over wide areas***
Project Number:	**SIP4-CT-2004-516171**
Deliverable number:	**D9.2-6**
Due date of deliverable:	**30.04.2008**
Actual submission date:	**09.06.2008**
Deliverable lead contractor:	**TAS-F**
Deliverable contributors :	**All**
Revision	**Final**

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission services)	
RE	Restricted to a group specified by the consortium (including the Commission services)	
CO	Confidential, only for members of the consortium (including the Commission services)	

Coordinator contact details :

Name : *Pascal Lochelongue*
Address : *100 Bd du Midi – BP99 – 06156 Cannes La Bocca cedex*
Phone Numbers : *+33 (0)4 92 92 6123*
Fax Numbers : *+33 (0)4 92 92 7760*
E-mail : *pascal.lochelongue@thalesaleniaspace.com*
Project website : *http://healthware.alcasat.net*

TABLE OF CONTENTS

1. INTRODUCTION

The Healthware project aimed at **validating and promoting the use of a light and cost effective technology, the DVB-RCS-** in geographic areas encountering **difficulties with terrestrial communication networks, without the necessary high transmission rates for running interactive applications based on video-conferencing**, like collaborative staff meeting, tele-expertise, tele-consultation and medical training, as well as exchange of high volumes of data.

Healthware is an **Integrated Project, co-financed by the European Commission**, DG Enterprise and Industry, which started on 1st May 2005 **for a three-year duration.**

Gathered around the project's coordinator, THALES ALENIA SPACE, 19 partners from the world of **telecommunications and engineering, and also University Hospitals, research and medical institutions have come together to implement different pilot networks of tele-expertise, tele-consultation, home services for patients and medical training,** spread **throughout Europe**, in **the** Czech Republic, Poland, Cyprus, Crete and Greece, United Kingdom and France.

This pilot phase targets **demonstrating the added value of satellite communications** for a better delivery of healthcare, and **so** in the frame of three medical specialties: **chronic respiratory diseases, oncology and cardiology.**

HEALTHWARE pilots have been run meanwhile at hospitals and universities:

- In Cyprus, acutely injured patients seen in the Larnaca General Hospital often have to be transferred to the Nicosia New General Hospital, which are better staffed and equipped for serious injuries. Using Healthware enabled Teleconsultation only those patients really in need of the transfer are undergoing the transport.
- In Greece medical staff working physically and digitally isolated in rural primary care centres can join Continuous Medical Education courses via Healthware satellite links.
- In the Czech Republic, lectures and interactive sessions with students and young radiologists located in remote sites, sharing the content of University knowledge database are realised.
- In Poland a district hospital gets a second opinion for pulmonary cases by sending patients' radiology images to experts in a university hospital and by videoconferencing.
- In the UK cancer patients in one hospital are treated based on the second opinion obtained from a specialist in a hospital from another administrative area, to which data cannot not be securely transmitted without the Healthware satellite link.
- For France three scenarios have been included: 1) Coordination of emergency rescues ("Plan Rouge") and training of Fire Brigade medical staffs. 2) Satellite

teleconsultation makes the ambulatory treatment of psychiatric patients sustainable in an isolated town 3) A GP does parts of its visits to a remote nursing home via videoconferencing in the patients' rooms.

- In Italy, patients are monitored and video-teleconsulted at home to assess health's status

The use of DVB-RCS and the availability of performing and adapted e-health applications offer **remote areas with increased connectivity and interactivity, so as to reduce the digital divide and to improve the comfort of the patients as well as efficiency of medical staffs, while ensuring costs containment.**

DVB-RCS is a two ways satellite broadband technology whose ground network independency enables customers currently suffering of the lack of terrestrial broadband networks, to access value added services. The DVB-RCS Open Standard solution is a mature and fully operational technology implementing DVB-S norm on the forward link and offering powerful capabilities (currently up to 2 Mbps return) on the return link to access and transmit over satellite from anywhere. It ensures interoperability with heterogeneous network like terrestrial, mobile, wireless and secures customer investments in infrastructure. The two-way design and high rate capability of the return channel provide network functionality to support new generation of interactive and multimedia applications. In addition, the implementation of QoS and security mechanisms, guaranteed bandwidth, multicast protocol, TCP acceleration, … complies with reliability and security requirements of telemedicine applications.

Benefits of this solution's implementation are numerous, providing medical staff with a **large broadband access to expertise and hospitals**, allowing a **better management and coordination of care in case of emergency or crisis**, making it possible for **patients to be monitored and cured while staying at home,** offering access to **medical training, medical information and knowledge** without any geographical barrier, and also, allowing to **make substantial savings in healthcare expenses** thanks to a better coordination of care and services.

2. PROJECT OVERVIEW

The HEALTHWARE project's consortium is composed of partners from a broad spectrum of fields covering a competence area suitable for caring out the project: telemedicine, medicine, telecommunications, …

- Thales Alenia Space France (TAS-F)
- Eutelsat (EUT)
- D'Appolonia (DAPP)
- C2 Team Ltd (C2T)
- Telemedicine Technologies (TTSA)
- Forth ICS (FORTH)
- Centre National d'Etudes Spatiales (CNES)
- Telespazio (TPZ)
- Thales Alenia Space Espana (TAS-E)
- United Bristol Healthcare nhs trust (UBHT)
- Medes (MEDES)
- Chu Toulouse/IET (CHU TO/IET)
- Total care networks (TCN)
- Telbios (TLB)
- Ehtel (EHTEL)
- Jagiellonian University (JU)
- Mazaryk university (MUB)
- University of Cyprus (UCY)
- Remifor (REMIFOR)
- Cardioexpress (CARDIOEXPRESS)

The technical approach retained in the project to reach the objectives is based on two phases:

- In the first phase, following end-users requirements definition, several end-to-end services have been integrated and validated through industrial tests, then operated with satcom (satellite telecommunication) equipment on a **first step pilot basis**; they deal with several medical applications and user groups that are currently using terrestrial or mobile telecom technologies.

  1st step: Collect and Define in details the requirements

The goal is to avoid missing any important requirements related to the telemedicine applications selected (telediagnosis, medical training, services at home, teleconsultation) in the oncology, cardiology and chronic respiratory diseases domains.

2nd step: Integrate and Develop technology modules to meet the requirements

Several main standards and technologies have been already identified for implementation through the Healthware project. It is however necessary to integrate management, security, QoS modules to deliver optimised and reliable services as well as application modules corresponding to the required end users functionalities.

3rd step: Integrate the interoperable telecom platform and Validate the services

A testbed platform has been designed to validate the integrated and developed modules and to implement usage of Satellite telecommunication services for telemedicine applications. The testbed platform allows industrial validation. Trials are conducted with the medical partners and users over reduced pilot networks. The pilot networks allow early involvement of the users as well as on the field validation and feedback.

- In the second phase, after month 18, the applications and the telecom networks has been extended and consolidated into **operational pilot services platforms** using the DVB/RCS technology that is able to deliver the enriched telemedicine services on a large scale.

  4th step: Deploy large pilot network to validate the services

  The validation has been performed over a large scale network. The telecommunication platform and the telemedicine services are validated after training of some of the personnel involved at the end-user side and refined to achieve the objective of the project.

  5th step: Review the results and provide a set of recommendations for operational implementation

  The users feedback have been regularly collected and analysed to refine the services if necessary and to obtain the end-users services acceptance.

  6th step: Results dissemination

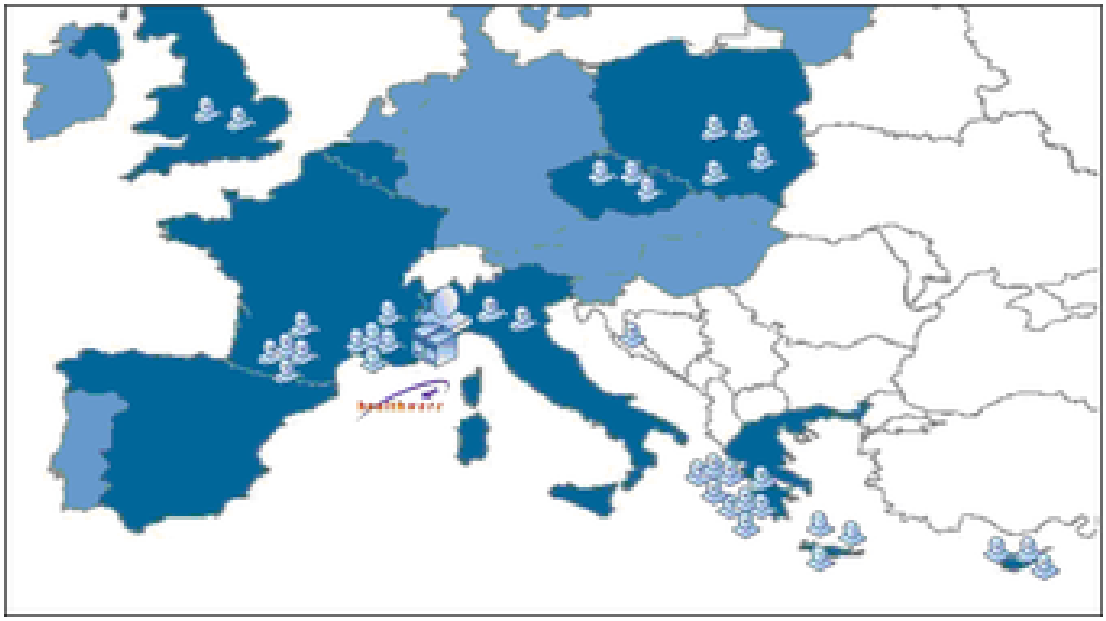
  The results of the project have been disseminate through website, workshop, publication, …..

3. PROJECT'S RESULTS AND ACHIEVEMENTS

The project has designed, manufactured, integrated, tested and validated a telemedicine and telecommunications platform to be used for interactive tele-consultation, remote interactive training, second opinion and homecare. The most important achievement was the actual architecture and the results from the pilot medical networks. Indeed, the pilot medical networks operation has validated the architecture and helped to propose how the platform or part of it could be used in the future.

3.1. THE HEALTHWARE TELEMEDICINE PLATFORM AND NETWORK

The Healthware telemedicine network is composed of about 40 sites over 7 European countries. Sites are equipped with DVB-RCS satellite terminals and with telemedicine workstation to connect to the Healthware Telemedicine platform and access to the services.

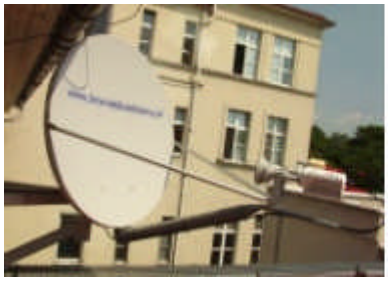


3.1.1. HEALTHWARE NETWORK DEPLOYMENT

- Five sites in Toulouse area, South of France (Lannemezan Hospital and Bagnères de Bigorre Medico-Social centre, Purpan hospital, EHPAD Las Ramondias & Medical practice in Luz St Sauveur). The pilot medical leader is CHU TO, France.


- Five sites are installed and managed by REMIFOR, France : Valabre (ECASC), REMIFOR headquarters in Draguignan, ENSOSP Aix en Provence and VSAT – "véhicule satellite d'appui technologique"), SDIS 13 in Marseille


- Four sites are installed in Poland : Jiagiellonian University Hospital in Krakow, Respiratory Medicine centers in Rzeszow, Kielce and Proszowice




- Three sites are installed in Czech Republic : Masaryk University in Brno, Military hospital in Brno and General Hospital in Znojmo


- Three sites are installed in Cyprus at Nicosia General Hospital, General Hospital in Larnaca and Evangelismos Hospital in Paphos,


- Two sites are installed in Bristol and Ashford (UK).


- Two sites are installed in Italy and managed by Telbios for homecare purposes.


- Fourteen sites in Greece at Cardioexpress, Venizelio, Forth, EKAB (Prehospital Emergency Coordination Center in Crete), Rodovani, Voukolies, Anogia (for the account of TCN), Sikinos, Folegandros, Anafi and Thirasia. Charakas, Kandanos and Santorini have been recommissioned.

3.1.2. HEALTHWARE TELEMEDICINE PROGRAM

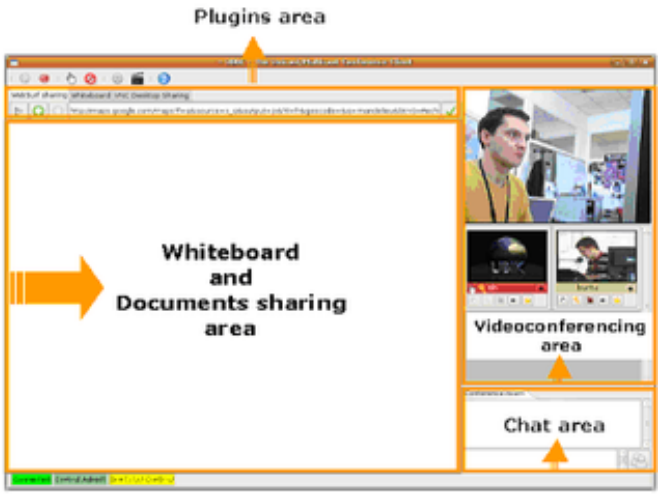
The HEALTHWARE telemedicine platform provided end-users with access to the services, allowed progress of the validation phase and to generate feedback from the users.

As soon as platform integration has been completed and sites acceptance tests done, the pilot network leaders have been proceeding with the usage phase. Thales Alenia Space was collecting and updating a weekly usage planning in order to provide the whole consortium with an up to date view of the planed usage. Each pilot network leader was in charge of managing sessions, inviting participants and make sure of the good achievement of the session, providing regular feedback to the technical staff about problem or malfunctioning.

Concerning software application, and in order to avoid installation of various solutions on the Healthware pilot network sites, a trade-off was conducted after a few months trial period. Finally, Thales Alenia Space **multimedia communication software** was approved by the whole Healthware end-users community and installed on each telemedicine workstation.

The proposed multimedia communication software is a Collaborative Working software based on a client/server architecture, which allows remote users to join a virtual room to work with and get real time and interactive feedback from the other participants as if it really was physically in the meeting room.

Main features of the software, both at client and server sides are as follow :



- The Chat is a handy tool used for text based conversations. The Chat module is useful when you do not want to use audio, during a presentation or lecture for instance. It is also useful for getting people's attention. A message sent through the Chat area is seen by all the participants. On the other hand, the leader has got also a powerful one-to-one function that can be used to send audio and text messages to a single recipient.
- The Whiteboard is ideal for sharing and commenting documents and drawings, taking meeting minutes, scribbling and sketching, etc. It supports multiple pages which in turn can be used simultaneously by several users. Pages can be saved to

disk and later on reopened. It is possible to import images, text and MS Office documents (it can also share/present any other window open on the computer). It can also capture and import picture from the webcam in real time.

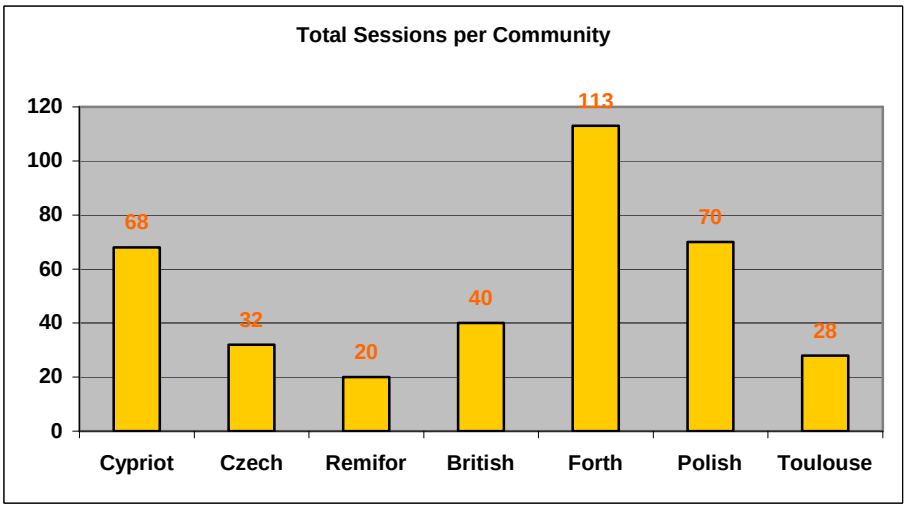
- Synchronized Web Surfing : the application supports collaborative Web surfing, i.e. one participant can lead others on the World Wide Web and browse pages to provide participants with particular contents. It uses default computer web browser like IE, Firefox, Safari, … and is compliant with Flash or Dynamic Web (CSS, JS) technologies.
- File transfer
- Application sharing : Microsoft Office, Professional ( ), possible sharing using computers with different Operating System (Linux / Windows)
- Videoconference : video codec H.264, H.263, H.261, audio codec Speex, GSM, Transport stream RTP/RTSP, UDP
- Videostreaming : streaming of video/audio data flows from IP camera (MJPEG / MPEG-4 or H.264), streaming of video files (AVI, OGG, DIVX, MPEG, VM ...), processing of webcam images (contrast, alpha, zoom), video sizing (QCIF, CIF, 4CIF, Full Screen)
- Connection in Unicast or Multicast mode
- Multiplatform (Windows, Linux, and Mac OSX)
- UDP and/or RTP streaming
- NAT traversal with the STUN technology

Thales Alenia Space Multimedia Communications software has then been used to perform teleconsultation, remote interactive training as well as a few second opinion sessions.

The Healthware project gathers 7 user communities:

- **CHU/IET Toulouse** coordinated by Dr P. Rumeau in France
- **Remifor** coordinated by Cdt B. Jannin in France
- **Telbios** coordinated by L. Colitta in Italy
- **Forth** coordinated by A. Kouroubali and V. Kontogiannis in Greece
- **Cyprus** coordinated by Dr. Th. Kyprianou with the support of G Panayi from Nicosia hospital
- **UK** coordinated by Prof. Shastry from the Royal Infirmary Hospital in Bristol
- **Poland** coordinated by M. Duplaga from Jagiellonian University in Krakow
- **Czech Republic** coordinated by M. Javornik from Masaryk University in Brno

The figures below show the distribution of sessions per user community.



HEALTHWARE pilots are running meanwhile at hospitals and universities in Cyprus, Czech Republic, Greece, France, Poland and the United Kingdom. The selected scenarios and practical examples demonstrate the way the Healthware pilots contribute to a better delivery of health care by employing satellite telecommunications. Following are some examples of telemedicine realisation done in the frame of the Healthware project's experimentations.

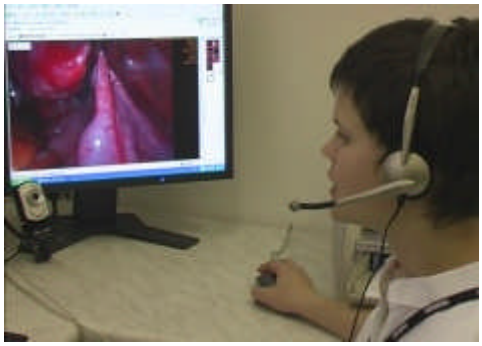
For France three scenarios have been included:

1) Supported by Healthware satellite links emergency rescues ("Plan Rouge") are coordinated.

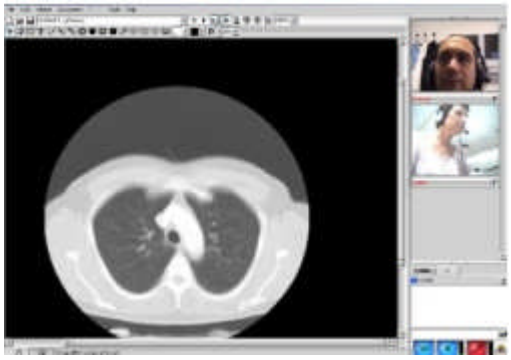
2) Teleconsultation via satellite makes the ambulatory treatment of psychiatric patients sustainable in an isolated town

3) A GP does parts of its visits to a remote nursing home via videoconferencing in the patients rooms, thanks to the combination of satellite link and local WLAN.

In the UK cancer patients in one hospital are treated based on the SECOND OPINION obtained from a specialist in a hospital located in another administrative area, to which data cannot not be securely transmitted without the Healthware satellite link.

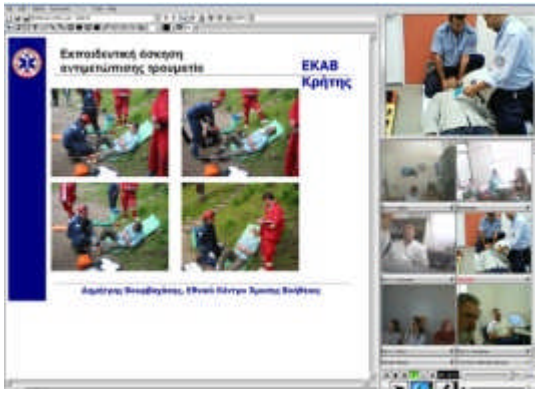


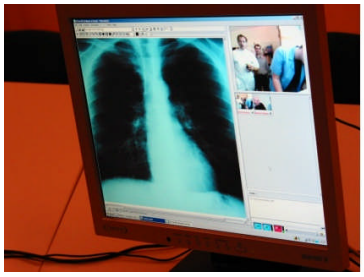
In the Czech Republic, the teachers from university hospitals prepare medical courses (case studies). They are focused mainly on oncology disciplines.



In Cyprus acutely injured patients seen in the Larnaca General Hospital often have to be transferred to the Nicosia New General Hospital which is better staffed and equipped for serious injuries. Using Healthware enabled TELECONSULTATION only those patients really in need of the transfer are undergoing the transport.

In Greece medical staff working physically and digitally isolated in rural primary care centres can join Continuous Medical Education courses via Healthware satellite links.





In Poland a district hospital gets a SECOND OPINION for pulmonology cases by sending patients' radiology images to experts in a university hospital and by videoconferencing.

In Italy patients at home are supported by health monitoring & counsel via interactive TV

Based on the significant Healthware network usages, an acceptable level of sustainability of the end-to-end solutions has been achieved. It is a sign that the delivered solutions are close to "operational" conditions and have reached an acceptable level of performance to go on the market.

Regarding delivery of "turn-key" end-to-end service, the pilot operations have evidenced the difficulty to efficiently integrate the whole set of operation components (applications, automatic processes, quality of service, satellite system & network, satellite terminals, operations) supplied by different providers to ensure an efficient support and trouble shooting to the users and / or to anticipate problems at the user site: the fact that difficulty in setting up properly the end user local network is not of the responsibility of the service provider, however it may considerably impact the felt added value of the delivered service.

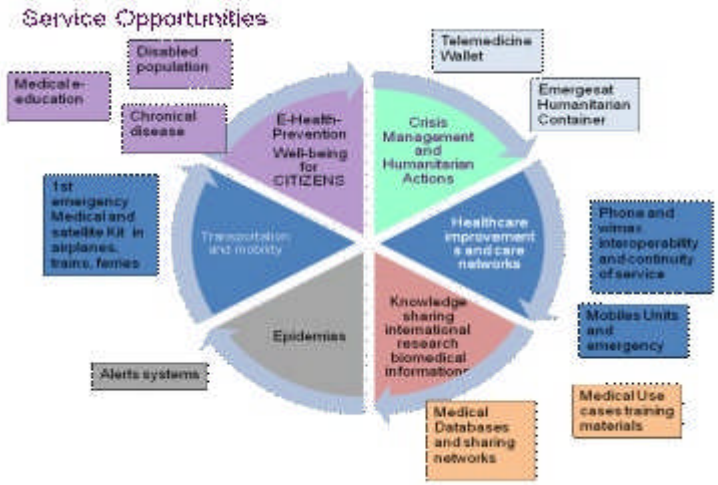
Multiple competences are needed (software, networking, satellite communications, video and audio) and trouble-shooting procedures must be thoroughly studied and established, on site interventions well ruled (otherwise resulting in high operational costs) and the terminal hardware well selected and adapted to the kind of users (for instance, noisy satellite modems are designed to be hosted in professional computer rooms, not at home). This just further evidences that the integration work is not obvious, requires high efforts and shall not be considered on a case by case, but from a specialized service operator provided that the market creates the conditions for sustainability.

Regarding usages (duration, frequency, etc…), the Healthware project has demonstrated that the proposed telemedicine solutions well suit to Remote Interactive training, Interactive teleconsultation, Second opinion as different kind of usages can now rely on the same software and system.

3.2. SERVICES' OPPORTUNITIES

This part consists in analyzing opportunities generates by services around telemedicine. We analyzed the various possibilities presented by telemedicine to offer service to society.

Hereafter are proposed a set of solutions addressing problems relative to the medical domain with an approach aiming at "reducing social inequalities in accessing knowledge, training, health and information thanks to the networking of human beings".



3.2.1. BETTER MANAGEMENT OF HUMANITARIAN ACTIONS AND CRISIS

Humanitarian crisis linked to industrial or natural disasters, terrorist acts happen every year and most often, traditional communications means are out of order in these contexts.

Satellite, as it substitutes itself to those classical networks, appears as the only solution to recover connectivity and communication facilities. In most of the cases, satellite is the unique way to communicate, and such in any point of the disaster's area, with an easy and quick deployment and with a guaranteed interoperability with potentially still existing and functioning infrastructures. Rescue teams can reach the area more quickly and pore precisely and more efficiently, with prior information on the concrete situation and needs, which allows a well planning of the rescue plans and of the nature and volume of rescue needs.

3.2.2. MAKING MOST ADAPTED MEDICAL KNOWLEDGES AND COMPETENCES AVAILABLE FOR HUMANITARIAN AND SANITARY CRISIS.

A substantial decrease in medical demography is observed for a few years, and such because of the decrease in the activity of the professional reaching the end of their career, the feminization of the medical profession, decrease in each actor's amount of worked hours, decrease in general practitioners' proportion among the population, etc… In parallel, the claim for healthcare is substantially increasing. Isolated or very distant areas together with mountains areas are the most frequently damaged by natural disasters.

3.2.3. BREAKING ISOLATION IN DEVELOPING COUNTRIES

Satellite technology represents a unique solution to break isolation in developing countries, as it allows establishing communication enabling telemedicine activities while limiting costs relative to the infrastructures' development.

3.2.4. ACCESS TO INFORMATION AND TO TRAINING FOR FOREIGN PROFESSIONALS AND SHARING OF KNOWLEDGE

The goal of medicine is to ameliorate the quality of life or to save life. Efficiency is the key word in this domain. Cooperation between professionals of healthcare and mutualisation and optimization of knowledge are success keys for the quality of healthcare.

Researching together and exchanging data will allow understanding a certain number of mechanisms leading to some diseases, chronic or orphan… This is the notion of Network of Excellence.

This provides the following opportunities:

- ⇨ To make the training of doctors and nurse more systematic.
- ⇨ To train students in accurate information technologies, especially for surgeons.
- ⇨ To create a Virtual University in Medicine accessible to all.
- ⇨ Training medical staff on the new practice and new treatments.
- ⇨ To broadcast surgeries in the frame of an updating activity of surgeons
- ⇨ To favour the exchange of data, of knowledge and of competitiveness among the institution and the medical staff.
- ⇨ To reinforce collaborative medical practice among the health professionals

3.2.5. BETTER CONTROLLED EPIDEMICS

A certain number of contagious diseases are linked to modifications in the climate or the environment. By detecting variations in temperatures, in vegetations, or water aspect of the surface of earth through satellite technology, a certain number of risks can be identified and anticipated, especially in inaccessible areas. It allows to warn the population in time to take protective measures.

Opportunities:

- ⇨ Create and share an epidemiology database
- ⇨ Create early alerts' networks
- ⇨ Create alert centres linked to environmental factors contributing to health troubles

3.2.6. BEING MOBILE, USE TRANSPORTATION IN SECURITY

We are all bound to travel regularly and no one is out of danger in such a mobile position: Any health incident in a train, a plane or on a boat during a cruise can happen, and it is nowadays possible to rescue the people on board of those vehicles. The stake is to be able to take all main first emergency medical measures then to communicate them to a medical professional located in a hospital or in an assistance center.

3.2.7. WELL BEING AND PREVENTION

A great increase in the demand for healthcare is due to the augmentation of chronic diseases, the extension of life duration, and the growing demand for better living condition….

3.3. NEW SERVICES

Access to infrastructures, then to contents, and then to knowledge…such developments will allow less favored countries to catch up their delay in the implementation of the necessary medical infrastructures.

Thanks to ICT, such countries can improve the situation in health, but also for education, teaching, and research… If satellite constitutes a wonderful tool for medicine, it does not limit itself to this domain, on the contrary, all domains are more or less concerned by this technology.

New services are created from the derivation of existing functionalities or infrastructures to mutualise costs, or to better fulfil the users' needs and expectations; The following items and concrete example demonstrate of the great potential proposed by the satellite technology for establishing communication and interaction among communities, their members and to contribute to the great trends and issue faced by our modern world, being ecology, well-being, security, equality and digital divide, economic development, research...

4. DISSEMINATION

4.1. PROJECT WEB SITE

The Healthware website has been set-up. Connect to the HEALTHWARE website via the following URL:

http://healthware.alcasat.net

4.1.1. HEALTHWARE WORKSHOPS

The workshops are a key part of the Promotion Plan involving all the Partners in order to promote and exploit the project results and services to extend the value of cooperation at a Europe-wide scale, in particular by enlarging the potential partners of the User and Citizen Open Group.

As a consequence, the workshops have been conducted to enable the dissemination of DVB-RCS knowledge and telemedicine applications to European Citizens raising public participation and awareness of this field of new technologies :

1. **Luxemburg, Med-e-tel -April 2006**

   As a conclusion of the first workshop, the user, market and deployment dimensions of the HEALTHWARE project were jointly summarised by Dr Stephan Schug, manager at EHTEL, moderator of the afternoon session and of the round table, in his conclusion, as follows:

   - The presentations of Mr. Olsson, Mrs Ricard and Mr Dobrev reminded the audience that eHealth is a main topic for EU and ESA, that could help the HEALTHWARE project to ensure sustainability of services developed through the project
   - Mr Lochelongue presentation of HEALTHWARE project stressed the DVB-RCS European standard, easier to use, independent of other technologies, easy to implement and favourable to an optimal use of new technologies in telemedicine applications
   - Mrs Frithiof from EHTEL insisted on the fact that not everyone can speak on patient's behalf, mostly concerning evaluation and perception of what patient's benefits are : telemedicine should be more often perceived from the patient's side

- Prof. Horsch, through his fruitful experience, showed different perceptions and realities on implementation and sustainability of telemedicine services/applications
- The partners' presentations stressed interesting experiences as well as expectations and contributions to HEALTHWARE's success

2. NORWAY, TTEC -JUNE 2007

Using the provocative title "Elderly, who cares", TTeC07 focused on the inclusion of elderly people – with and without illnesses and functional disabilities – into societal life.

As a conclusion, Telemedicine can exist only if Health professional are convinced by the efficacy and utility in their daily work. Economical aspects are also a crucial issue for the professional health but also for the patient point of view (saving time by avoiding medical transfer and saving money). However, it is important to keep in mind the evident of the professional perspectives of the different professions that have long tradition and use the protection of the patient; We have to be realistic to preserve their roles like the nurses and to respect the patients by preserving their medical. On the other hand there is some IT and TM coming up and so the role could be transformed. We still need progressing. It is a very sustainable development but we are looking for the future and the involvement of the Politics!

3. FRANCE, THALES ALENIA SPACE -MARCH 2008

The third event took place in Cannes, at Thales Alenia Space premises in the form of a symposium with live demonstrations.

The demonstrations had shown that people were already able to manage systems while they deal with patients or communicate with other specialists. The capabilities of DVB-RCS had been demonstrated, its ability to transmit at a high rate and with a quality of service were key issues for the development of telemedicine, so the objective had therefore already been achieved.

As a conclusion, everyone at the symposium is convinced that telemedicine could bring a lot to users, patients, scientists and doctors and believed that it would become deployed widely in the future. The onus was now on influential people who try to overcome the two or three barriers that were continuing to block its development. There was already a proposal in France about payment and a law is existing, giving telemedicine a legal framework. Some important steps had therefore already been taken.

4.1.2. PUBLICATIONS

Several publications have been produced :

- **Connecting People through satellite-based Telemedicine Solutions: Scenarios and Practical Experiences from the Healthware project**
- **Sustainable Telemedicine: paradigms for future-proof healthcare: A Briefing Paper**

5. RECOMMENDATIONS AND CONCLUSION

In the frame of the Healthware pilot usage phase, it has been demonstrated that satellite communications provide a unique added value regarding telemedicine in terms of performance, security, flexibility and potential and are specifically adapted to:

- ⇨ Rural areas, islands where terrestrial connectivity is inexistent or very weak, and in any other place where terrestrial links are not adapted to the needs;
- ⇨ Crisis situations and areas: satellite cannot be affected by a natural disaster and ground elements of the satellite technologies are restricted to very limited areas
- ⇨ Satellite implementation are very quick, evolutionary and immediately available:
- ⇨ Satellite allows to guaranteed security and confidentiality of data

Accordingly, satellite systems shall be considered as a legitimated tool at disposal in the global system of telecommunications, and is not only a back up or complements to complete existing terrestrial networks. In terms of business opportunities, satellite gets a unique position thanks to the great benefits it brings for multipoint communications.

- ⇨ Satellite communication allows leaping over the geographical constraints like frontiers, mountains, relief, distances,
- ⇨ Satellite communication allows bringing together people, to reduce the digital bridge between regions and communities
- ⇨ Satellite communication proposes some very reliable and performing information and communications means.

Considering these elements, it is then possible to propose an offer of services, which is complete and adapted to the different kinds of user and of specific needs and requirements, by utilizing the knowledge relative to satellite, to experimentations that have been realized and the usage feedback.

Recommendations

Based on project's achievements, the following recommendations regarding telemedicine can be done:

- ⇨ Transform the patient-medical relationship: Telemedicine is an agreement between the general public and medical community
- ⇨ Educate doctors and patients regarding ICT: Raising awareness
- ⇨ Think about a new organization
- ⇨ Computerize all the medical profession to avoid disparities
- ⇨ Solve the problem of language in Europe
- ⇨ Create permanent infrastructures for telemedicine applications to be used in a undifferentiated way. These infrastructures should be created without reference to one specific telemedicine application. They should be able to support any product or telemedicine service.
- ⇨ Think of the needs of personnel involved in telemedicine: intermediaries, technicians, and many other actors such as, for example, the public and private institutions, which participate in the public health policies and Social Security.

- ⇨ Change mentalities and policies individualist culture.
- ⇨ Implement on large-scale national and international projects because the projects are too often micro-projects at the regional level
- ⇨ Reflect on current practice by identifying existing projects, launching experiments and imagining new uses. Beyond the individual uses at home, community uses are fundamental in rural areas.

It is necessary to take into account the risks associated with the practice of telemedicine. These are:

- ⇨ Cultural (acceptance of technology)
- ⇨ Financial (ex: payment of the doctors / communications)
- ⇨ Ethical (Respect of private life)
- ⇨ Psychological (big brother)
- ⇨ Legal
- ⇨ Administrative
- ⇨ Ergonomic (adapted to the target)
- ⇨ Skill (competence).

Recommendations outside the field of telemedicine: Numerous satellite applications can be imagined and we have cited a few. To go further, it would be necessary to raise the issue of satellite possibilities for a specific theme. In any case and the applications that develop around telemedicine, it is necessary to share all practices and experiences to offer the “best of satellite” and make the most of all these advantages.

Conclusion : Everywhere, everytime

The implementation of the telemedicine has many advantages, at a worldwide level research (and knowledge), at a regional level (better organization of care and access to the care for all) but also personal (better quality of life). Overall, we can say that an efficient implementation allows us to:

- ⇨ Better organize the medical profession (Strengthening modes of practice, opening up emergency services, opening up surgeries, avoid unnecessary medical visits, develop preventive care)
- ⇨ Improve global knowledge (database for shared information)
- ⇨ Strengthen and improve the world aid...

Telemedicine services concern: public authorities (lower costs while increasing efficiency and global quality of health care and social services), internet service providers, on-line service providers, contents suppliers (broadcast of contents on demand or in scheduled mode: audio files, video, photo), telecommunication operators, digital television broadcaster, corporate networks, training organizations, insurers, nomadic activities wealthy people, mobile people, the elderly, the chronically ill, people recuperating after an operation for example.

In fact, telemedicine can be useful at all times:

- ⇨ Improved home life:
- ⇨ Improved community life
- ⇨ Improve life on the move
- ⇨ Improved working life

Telemedicine will profoundly change the living spaces, medical practice and coaching

- ⇨ Independence, autonomy and Reinsurance
- ⇨ Adaptation of the environment itself
- ⇨ Digital Accessibility
- ⇨ Opening up

End of Document