Aeronautics and Space

Priority 4

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Session 1: HEALTHWARE ACHIEVEMENTS

1.1. OPENING REMARKS

Michel CASTELLANET

Director of Applications, Thales Alenia Space

Michel CASTELLANET, Head of Applications and End-to-End solutions Unit, welcomed everyone to Cannes. Thales Alenia Space key activity in Cannes is manufacturing of satellites. However, to promote satellite technologies and ground systems, it was also involved in the integration of satellite-based applications and especially e-health is one the main activities in that area. Thales Alenia Space in Cannes is strongly involved in e-health and telemedicine activities and works closely with other division of the Thales Group.

1.2. WELCOME ADDRESS

Paul De BREM

Space Journalist/Meeting Moderator

Paul DE BREM welcomed everyone to the third Healthware Symposium. He explained that the Healthware project would be completed in two months' time and that the time had now come for everyone who had been involved to share his or her experience. The day would welcome people providing their analysis of what had happened and there would be live demonstrations of Healthware project related activity, as well as feedback from the users. One of the aims would be to think about the best way of achieving and financing sustainable satellite-based telemedicine.

In addition to Thales Alenia Space SpaceCamp in Cannes, which was the main place of the symposium, other countries were connected to the event, like Cyprus, Poland and UK.

1.3. OVERVIEW OF THE HEALTHWARE PROJECT

Pascal LOCHELONGUE

Healthware Project Coordinator, Thales Alenia Space

Pascal LOCHELONGUE described the Healthware project driven by the European Commission, particularly Directorate General Enterprise & Industry (DG Enterprise). The project had been submitted within the "Aeronautic and Space" thematic priority in the Sixth Framework Programme, with the objective of addressing the development and implementation of end-to-end telemedicine applications and solutions using DVB-RCS satellite-based telecommunications systems. End-to-end applications were much harder to achieve and the project had the objective of promoting Digital Video Broadcasting - Return Channel via Satellite (DVB-RCS) and demonstrating that the technology complies with requirements of telemedicine applications.

The duration of the project was three years, starting in May 2005, and it was important to show today what had been done so far. Two other symposiums had taken place in Luxembourg in 2006 and in Tromso, Norway in 2007, and this third symposium would be much more demonstration-oriented. The consortium was composed of 19 partners.

The DVB-RCS standard is a two-way satellite technology, meaning that it is possible to receive from the satellite as well as transmitting to the satellite. No ground infrastructure needed to be developed and you are promptly able to enter into the network once you have been equipped with a terminal. The technology is based on a star topology, with a main hub and remote terminals. The Healthware applications platform that hosted all the software and applications needed for telemedicine purposes are co-located with the satellite hub. Remote sites are equipped with a typical and easy to install DVB-RCS satellite interactive terminal. The Healthware network is composed of 40 remote sites widespread over in eight European countries.

Within pilot networks activity, there has been, for example, a number of local activities, such as four sites working together in Poland. There have been, as well, exchanges between countries, specially regarding a medical training programme shared between Greece and Cyprus. Globally, the main medical activities that had been performed were first, remote medical training and interactive teleconsultation, secondly second opinion. In Italy was running a small pilot project on homecare.

1.4. FUTURE PERSPECTIVES AND SUSTAINABILITY OF OPERATIONAL END-TO-END TELEMEDICINE SERVICES BASED ON THE HEALTHWARE VALIDATION

Yoani MATSAKIS

General Manager, TTSA, Paris

1.4.1. TTSA

Yoani MATSAKIS explained that Telemedicine Technologies SA (TTSA) is first and foremost a software engineering company, specialised in health. Standard satellite operators are not organised to address and meet the specific needs of the medical sector and it is important to have actors who specialised in this sector. TTSA worked closely with Thales Alenia Space and has been acting as a service provider. They have contracts with the satellite operators, through which they accessed to their satellite resources. In addition, they have developed their own system to manage the satellite bandwidth.

1.4.2. SCOPE OF ACTIVITIES

Network operations within the project related to how the hub of the satellite network itself was managed and TTSA deployed the terminals at the various locations, using the satellite operator's network installer. However, they did not operate the hub. Nevertheless, it would add value in managing their own hub, not so much for them, but for the end customer, as they would have been more reactive in a number of situations.

TTSA, which is a small company, has developed the satellite-based telemedicine activity as a secondary activity of the company. They work in the domain of clinical research and have also significantly developed medical assistance activity for repatriation of expatriates. In the future, the business structure for such company to remain viable would be to continue to develop activities using the normal telecom infrastructure, including the Internet, while satellite-based activities would, in the best case, represent about 30% of their total turnover. It appeared to be a real demand for this, in hospitals and in pharmaceutical and biomedical companies, for instance.

1.4.3. KEY ISSUES

1.4.3.1. Cost

In terms of sustainability, the questions of interest covered, for example, what the services would be and what kind of software and applications would be delivered to the end user. The crucial question was related to the cost of the service, which was a very sensitive issue, especially for the health sector, and the approach was very different to that of large companies. Working through the project, it become clear that more and more investment are required and such situation must be managed over the long term.

1.4.3.2. Providing the right technical environment

TTSA believed that satellite-based telemedicine key applications that still required some work are real-time applications, such as videoconferencing and collaborative working. Importantly, the ergonomics had to be right, as physicians did not want to have to bother with the technology. The guaranteed bit rate is also essential and there would be problems if it is not possible to allocate the required amount of bandwidth when requested. One of the essential achievements for TTSA in the project was that they had been able to implement automated policies to achieve guaranteed bit rates efficiently. However, the ergonomics had been a problem in the course of the project in respect of videoconferencing and there were still problems there, which presented a factor of complexity that would need to be reduced in the longer term.

1.4.3.3. Support and maintenance

Technical support and maintenance was another key element. With end-to-end service applications, you had to accumulate different pieces of solutions and deliver the complete chain. Everything had to be integrated and validated in advance and a telecom infrastructure and information system needed to be maintained. The easy part had been the implementation of software applications that could be continuously updated, but it was clear that it was necessary to set up procedures, infrastructure and a support team to be able to provide the appropriate support and maintenance. The initial installation needed to be very well planned and maintenance and support had to be included in the contracts. Initial user training and support was also very important. In a number of cases, TTSA had to interface with local area networks and that had been difficult to do at times.

If all of that was done properly, trust could be established in the system and it could become very operational from the medical point of view. It was also seen that having satellite Internet access was, in a number of cases, very important in terms of added value.

1.4.3.4. Conclusions

1.4.3.4.1. Minimum level for starting operations had been met

At the end of the project, TTSA felt that they had reached the minimum level for starting commercial operations. While things still needed to be improved, the complete chain had been set up. TTSA had been working hard on cost as well. Bandwidth sharing was very important and it was possible to provide a guaranteed bit rate. However, the cost, especially for satellite, became very expensive. Having a dedicated line and then holding a videoconference once a week implied a very low usage ratio. You therefore needed to share the bandwidth and have a large number of terminals and a lot of bandwidth booked to the satellite operators – and an additional issue was that availability of satellite capacity was not always immediate. Nevertheless, doing this way reduced the cost per terminal. The cost for broadband Internet satellite access ranged from EUR250-550 per month and the objective would be to have a similar situation for telemedicine. However, telemedicine includes the use of additional applications, which are not considered for Internet access.

The project had shown that it was possible to manage bandwidth properly and to deliver quality of service dynamically, without the need for any manual interaction of the operator. There could be an all-inclusive service that reached the target price of EUR300-600 per terminal per month, provided that there is a critical number of terminals of 200+ and a minimum of 10 Megabits per second total capacity for the network. This would reduce or suppress collision of demands, which arrived sometimes in Healthware. Emergency services needed the required bandwidth at any time. If you then had enough terminals and bandwidth, the likelihood of running out of bandwidth would be very small.

TTSA network currently is composed of 71 terminals and the mean usage confirmed the opinions that had been given earlier. TTSA therefore had a set of prices that is now possible to propose to partners.

1.4.3.4.2. Possibility of global coverage

Another issue had been the possibility of global coverage and with the help of Thales Alenia Space, TTSA has been able to achieve efficient interconnection of different satellite networks. There were, sometimes, limitations, such as the issue of quality of service, but that had been achieved.

1.4.3.4.3. Markets

In terms of markets, TTSA has been participating in a market study, concluded at the end of 2005, where it was clear that satellite based telemedicine is a very small market and might therefore be suitable for small companies. The main demand was for e-learning and training. The reason for that was that the regulatory framework for e-learning had less constraint than for teleconsultation, for example, where there was a patient involved. It was a niche market, therefore, that was highly fragmented and had strong dependence on industrial partnerships. As a small company, TTSA depends heavily of its satellite operator and that was why they wanted to acquire more flexibility by managing their own hub, for instance. A certain number of terminals were required to reach critical mass and be able to offer a service at an affordable cost, with the required quality.

It is also a specialised market and with very low margins. Therefore, for TTSA, as a telemedicine company, it is really an additional service that would differentiate their offer from those of their competitors.

1.4.3.4.4. A lot of effort required

Yoani MATSAKIS concluded by saying that he believed that the project has been a good demonstration that end-to-end service needed a lot of implementation. It could only be measured by the number of projects that had been undertaken and it had been observed that every time there is a new project, with new actors and a new solution being implemented, a lot of effort was required, and a lot of effort was still required to achieve the highest possible quality of service.

1.5. ROUND TABLE : USERS' FEEDBACK

Narasimha-Moorthy SHASTRY

United Bristol Healthcare Trust, UK

Louis LARENG

CHU Toulouse/IET, France

Mariusz DUPLAGA

Jagiellonian University, Krakow, Poland

Vassilis KONTONGIANNIS

Forth ICS, Crete, Greece

Pascal LOCHELONGUE

Thales Alenia Space, Cannes, France

Michal JAVORNIK

Institute of Computer Science, Masaryk University, Brno, Czech Republic

Nikki PAPHITOU

Intensive Care Unit, Nicosia General Hospital, Cyprus

Paul DE BREM

Moderator

1.5.1. COST

Paul DE BREM explained that in his discussions, many panellists had said that they were interested in keeping the systems, even when the Healthware project will end. The problem was the question of cost and Yoani MATSAKIS had now estimated price at EUR300-600 per month. What did people feel about that price?

Mariusz DUPLAGA thought that the terrestrial links were very expensive in some areas and that this was a level of cost that would be attractive. The issue of making bandwidth available when needed was important, but that was achieved in scheduling sessions and set up appropriate management of the service.

Michal JAVORNIK stated that different medical sites in the Czech Republic had previously wanted to cooperate with each other, but that the situation had now changed and it was now difficult to find people who did not have terrestrial connections. The question was therefore one of financial competitiveness. The price of EUR300-600 was very high, compared with the price of a terrestrial line.

Pascal LOCHELONGUE pointed out that the proposed price guaranteed bit rate and Quality of Service, compared to usual terrestrial offers people have in mind. Setting up Emergency services remains complex and need permanent bandwidth or bandwidth on demand, at a price which is still quite high. The point of achieving a critical mass of end users and to share resources is also a factor of success. The position of Thales Alenia Space is different of the one of a service operator. Thales Alenia Space is a satellite manufacturer and solutions integrator. Thales Alenia Space objective is to integrate and sale telemedicine solutions and systems to services operators then to work with operators who intend to use their systems and technology. Such offer is now in Thales Alenia Space product catalogue.

Nikki PAPHITOU explained that she had participated in the medical training part of the programme, where lectures were carried out between Cyprus and Crete. These had been very successful technically and had been very useful for people at remote sites. She had also participated in the emergency teleconsultation part of the project. This was about demonstration rather than putting things into practice and they had the chance to see images that had been transmitted via satellite, as well as seeing the physician herself. They were able to make an assessment of the patient and give some advice. This was very important for those remote areas.

Narasimha-Moorthy SHASTRY stated that in the UK they had wonderful terrestrial links and the Healthware project had enabled them to make a hybrid use that gave a greater return on the investment of their time and money. The advantage of the satellite project was the fact that it could bridge the divide between different health authorities. The pricing of EUR300-600 appeared vague. In his experience, they had planned activities and emergency activities. It was also important to appreciate that the same platform was used for e-health – second opinon and emergency care - and e-learning, and that was how the cost could be justified. The systems that they have been using would be more or less resident in a teaching hospital. Remote sites could be linked via terrestrial networks, connecting in a hybrid fashion. This was a very good service that had been offered to them by “Tentelemen” and Pascal, Xavier and the team.

Second opinion was a planned activity that had very specific protocols that needed to be followed and was an intense process. It was very important to look at it in different contexts and it was good to have figures for the cost now. Functionally, it was a very good system, although the bandwidth needs for cardiac activities had been too high.

1.5.2. PROJECT EXPERIENCES

1.5.2.1. Country experiences

1.5.2.1.1. Greece

Vassilis KONTOGIANNIS explained that in his part of the project they had deployed 11 sites, mostly for medical training. While there were some technical and organisation problems, these were overcome and they had now finished their first session, with the second one still in progress in partnership with Cyprus. Users found the training offered to have been very useful. In some regions, severe weather conditions had caused real problems through misalignment of the antennas and people needed to be careful when dealing with that kind of thing. There was no technical support on the islands, for example, which meant that doctors sometimes had to play the part of technicians. Islands were so remote that it could take technicians three days to get there.

1.5.2.1.2. France

Louis LARENG explained that he had been working on the project for three years in an isolated mountain site, where the aim was to link a nursing home and a hospital in the city, with continuous monitoring of patients. They used a usual H323 Polycom videoconferencing system with two configurations – one satellite-based and the other with terrestrial link. The clinician was able to see the patient and give instructions to the nurse.

The first configuration used end-to-end satellite connections, with a double hop and a double-600 millisecond delay. This was now working properly from the physician point of view. The double-hop infrastructure was first evaluated within the hospital of the University of Toulouse and found to be appropriate. However, when they switched to real usage by the psychiatrists who were located a long way from the hospital, the feedback was that the delay was too significant to be able to consider properly a patient who had mental illness. The psychiatrists' feedback showed that it was not usable with a double-satellite hop, so they decided to implement a single-hop configuration where just the remote site was connected via satellite. The University Hospital would then be connected to the terrestrial infrastructure that linked all the hospitals.

1.5.2.1.3. The UK

Narasimha-Moorthy SHASTRY commented that in the UK they had pushed the system to its limit. In the UK, they had linked to the Czech Republic, where there was a database that was immensely valuable. The Croatian link focused on ear, nose and throat (ENT). There, the intention was purely to demonstrate that this was an extremely useful platform for teaching via different applications. You needed an interoperable hybrid system – satellite to terrestrial networks - for this type of activity and that made it very affordable.

Pascal LOCHELONGUE advised that Professor Shastry was one of the more demanding partners in the project, who had stretched the system in different ways. This had been a very positive cooperation because it provided them with very useful feedback and allowed progress to be made. For a platform that was able to handle all the features, it was certainly essential to be fully interoperable. The first step to commercialise telemedicine services had therefore been achieved, at least with the first level of platform and applications. Improvements still needed to be made and when the project ended, this activity would go on.

1.5.2.2. Experiences of patients and other users

Nikki PAPHITOU explained that they did not have any direct interaction with patients, as they were concerned with lectures and physicians talking to physicians. Being in two different places could be problematic and it was helpful to have a technician available. It needed to be more interactive in a more direct way.

Previously, she had used a similar system in Canada, where telemedicine was highly developed. Sometimes this was the only way that someone could reach a specialist and people were very appreciative of the opportunity. That was the level of usage that Europe needed.

Mariusz DUPLAGA stated that patients had not been his focus in the Healthware project. However, general experience showed that patients were usually happier with telemedicine than physicians, who needed a lot of convincing that they could use the new tool. If the doctors used the system, patients would be confident about it. The benefits for the physician were simple – they did not need to travel hundreds of miles to a university hospital, as they would have done traditionally. In the second opinion work, the feedback was positive and patients wanted to see their doctors using the system.

Louis LARENG believed that patients were very satisfied according to patients receiving psychiatric care. It had been meant simply to be a test, but it became a real consultation at the end. They would therefore be happy to continue to use the system.

Michal JAVORNIK explained that end users in the Czech Republic were mostly biologists or students from university hospitals. Technical personnel were available and there were no major problems.

Vassilis KONTOGIANNIS experience was that doctors and medical staff did not have many problems with the technology. While some had a few doubts about it, most were happy.

Mariusz DUPLAGA had experienced the whole span of reaction to the technology. There was supportive and positive reaction, as well as negative reaction from people who were more reluctant to use the technology. However, it was important to underline that there was not usually a kind of standard custom service and pressure came from the users for some new functions. Scheduling physicians from different centres to come together for a videoconference was a real problem and at times it was necessary to assign one person solely to coordinating the doctors and come up with an agreed date.

Narasimha-Moorthy SHASTRY agreed completely with Dr DUPLAGA. In terms of how useful this was for patients, it was important to know whether the patients responded. You would only get an interaction like in cases of obstetrics, where a mother was being scanned and advice was being sought from someone who was hundreds of miles away. The mother would therefore be very happy about getting an instant response. In psychiatry, it was either direct feedback from the patient, the clinician or the nurse who was accompanying the patient.

What Dr DUPLAGA mentioned was very important. In second opinion, you were looking at a very structured format, with a pathologist, a radiologist, an oncologist and possibly a surgeon. If the entire data set required for one single patient was put in a structured format, it would add value to the entire system in terms of sustainability, reduction of bandwidth and acceptance by the end users. Clinicians wanted things to work the first time round. Some would love to use the system, but would only do it if you planned for sustainability and ease of use, with a stable platform. People had to see this as a learning and change process that would add value for patient care and they needed to work together with the technologies. Clinicians needed a bit of handholding and the technologists needed to understand the clinical perspectives.

1.5.2.3. The situation in Cyprus

Theodoros KYPRIANOU stated that they had just held a meeting with key players in telemedicine in Cyprus from universities, hospitals and the Ministry to identify the current applications of telemedicine in Cyprus and look at future usage. In the context of the Healthware project, there would be a review of the telemedicine project in Cyprus and in the light of the results they would aim to have the necessary interventions to optimise the outcome in several aspects of the health system in Cyprus.

2. SESSION 2: LIVE DEMONSTRATIONS WITH EUROPEAN HEALTHWARE REMOTE SITES

2.1. Introduction summarising the previous discussions and explanation of the live demonstration session

Paul DE BREM

Moderator

Pascal LOCHELONGUE

Healthware Project Coordinator, Thales Alenia Space

Paul DE BREM stated that the achievements in the Healthware project were tremendous and the project organisers thought it would be useful to demonstrate directly to the audience what telehealth was now able to achieve. First of all, therefore, there would be a demonstration of what happens during emergency teleconsultation on board the REMIFOR Vehicule Satellite d'Appui Technologique (VSAT). The VSAT truck was designed for the fire brigade and is equipped with auto-pointing DVB-RCS antenna and portable telemedicine workstation, to allow the medical staff to transmit X-ray, ECG and other images or data directly from the scene to the hospital.

Pascal LOCHELONGUE explained that this demonstration would show a fire brigade vehicle arriving on the scene of an accident and where the medical staff will use all the required medical devices to get close to and take care of the victim. There would be real time video transmission from the field to see how the victim is managed, followed by a discussion between the medical staff on the scene and a doctor here in the room, with the final objective of deciding whether the victim should be managed at the scene or transferred to the hospital. The doctor involved was Dr Comet, from MEDESSAT. In the demonstration, he would act as the specialist at the emergency medical call centre.

Dr COMET explained that the VSAT vehicle had been equipped with a terminal that could collect and transmit the patient's vital signs. Data would be received on the screen in near real time and there would then be a discussion. Terminals could be customised according to customers' needs and connected via satellite networks as well as ground networks.

2.2. Emergency teleconsultation on board the VSAT truck

French Civil Protection with Commandant Bernard JANNIN, France

A representative from the Euro-Mediterranean Network of Information and Training (REMIFOR) explains that an accident occurs on the road. The emergency vehicle is arriving on the scene, with medical staff on board. The doctor makes his first physical examination, helped by fire officers. At this stage, Dr Comet does not know if the victim is conscious or unconscious. It appears that the victim has a neck trauma and they are looking after that. It is important not to move the victim too much; as well a small catheter needs to be put in place. The fire officers can be seen preparing the infusion.

Dr Comet understands that there has been a serious fracture of the right leg, although he still has no information regarding the consciousness of the victim. He can see a man with a stethoscope. The demonstration shows the ability to transmit a video in real time from the scene of an accident, to give an accurate idea of what is happening there, about the seriousness of the accident.

Dr COMET explained that the video stream and the telemedicine data used the same facility. Pascal LOCHELONGUE also explained that the VSAT vehicle is a truck, with an antenna on the roof that allows the transmission of the video in real time at about 300 kilobits per second. The victim's vital signs were transmitted via the portable telemedicine workstation to the VSAT, using wireless technology, and from the VSAT they went by means of a DVB-RCS link to the medical centre.

There is then voice communication between the accident site and Dr Comet, where Dr COMET is told about the accident. The victim is described, including the extent of his injuries. An infusion has been given and the victim is quiet. The victim's arm and leg have been put in splints and he is complaining about a thorax pain, for no obvious reason. The doctor at the scene is proposing to bring the victim to the ambulance and realise an electrocardiogram. They are now moving the victim into the vehicle. Monitoring data will be sent to the call centre and there will then be a discussion about what to do.

Dr COMET explained that the VSAT vehicle was a normal vehicle and not a specific ambulance. Pascal LOCHELONGUE explained further that it is part of the fire brigade fleet of vehicles and maintained by fire brigade's staff. However, it was only deployed for major accidents when data or video transmission is required from the field. The vehicle was fully operational and could be deployed in a few minutes.

The victim is now ready to be moved and is immobilised in a very efficient way. The most difficult thing is to keep the cast in place.

During this phase, Pascal LOCHELONGUE explained that the mobile REMIFOR vehicle was connected via satellite to the Thales Alenia Space platform in Cannes. The Healthware platform was composed of two hubs: the Thales Alenia Space hub and a second hub managed by Telemedicine Technologies and Eutelsat. There were therefore different partners connected to both hubs and both hubs were interconnected through a secure terrestrial line. This allowed partners to communicate together over different networks, using different satellite systems. There were also two sites in the South West of France, which were part of the pilot network managed by the University Hospital of Toulouse and Institut Européen de Télémedicine. Partners in Poland and Cyprus were also linked via DVB-RCS to the hub managed by Telemedicine Technologies and this part of the network would also be demonstrated later in the day.

The infrastructure was quite heterogeneous, with different technologies and platforms, but Healthware was itself a unique platform. The objective was to allow everyone everywhere to be able to have common sessions and share in terms of telemedicine.

The victim is now in the ambulance. He is conscious, with no more than fractures of the leg and arm. He has received an infusion and the only complication is a strange pain in the thorax, which they want to check. The pictures show him having blood pressure and oxymetry measurement and data are displayed on a personal computer via a wireless connection. The technique has still not been fully developed for the electrocardiogram (ECG), so that universal serial bus (USB) connections are required.

Pascal LOCHELONGUE explained that the VSAT vehicle was designed with large antenna and power amplifier because a high bit rate was needed to transmit video and videoconferencing. Satellite positions were recorded in the system, and on the field it would take about five minutes to establish connection with the remote site.

Dr COMET is now waiting for data from the terminal. There is no keyboard; you just touch the screen. The data is now through and gives readings for pulse, oxygen and the ECG. There is voice communication again with the scene and Dr COMET is asked what is his opinion. As the ECG looks normal, but due to the thorax pain, he advises that the victim should be considered as a poly-trauma patient and that they should drive it as quickly as possible to Accident and Emergency. The session is then closed.

Paul DE BREM thanked Dr Comet and the REMIFOR team for the demonstration, which had been a big challenge.

2.3. Second opinion session in pulmonary medicine led by the Jagiellonian University in Poland

Mariusz DUPLAGA

Jagiellonian University, Krakow, Poland

Mariusz DUPLAGA explained that the demonstration was part of quite routine second scenario sessions that took place between the peripheral hospital of Proszowice and the Department of Pulmonary Medicine in the Jagiellonian University Medical College in Krakov. Dr Yeza Soya would lead the session from Krakov, with Dr Pavel Nastarak located in Proszowice. The demonstration would focus on the second scenario in pulmonary medicine.

Dr Nastarak starts the session. It is a consultation about a 60-year-old patient and Dr Nastarak gives details of the history and physical examination of the patient. Dr Soya asks if there are any risk factors for lung cancer and Dr Nastarak replies that there is strong evidence for that. Dr Nastarak gives further details of findings of tests that have been carried out on the patient. Dr Soya then asks about weight loss and Dr Nastarak replies that the patient informed them about some weight loss prior to admission. Dr Soya’s next question is on concomitant diseases and Dr Nastarak explains that the patient suffers from lumbar arthrosis and hypertension, which had previously been untreated. Dr Soya asks how current treatment is going and Dr Nastarak replies that they are treating him as a typical patient with chronic obstructive pulmonary disease (COPD) perturbation and describes the drugs he is receiving. His general condition improved very quickly after the treatment was administered and he is now generally in optimum condition for his state.

Dr Nastarak then transmits the chest X-ray and outlines what the findings are, and asks Dr Soya’s opinion. Dr Soya asks about a Computerised Tomography scan (CT scan) and Dr Nastarak replies that they carried a CT scan as a next step. Dr Nastarak then shows the different images where the tumour is visible close to the spine. Dr Soya asks what the size of the tumour is. He gives the measurement of the tumour, describes what they did and sets out their further findings. Dr Nastarak then shows further images of the tumour and explains that a biopsy was inconclusive. Additionally, they had done an ultrasonography that also found no changes in the liver. Dr Nastarak then asks Dr Soya what he thinks the most stable method of establishing a diagnosis would be for the patient. Dr Soya gives his advice. Dr Nastarak then suggests sending Dr Soya all the data concerning the patient and outlines what can be done for him.

Mariusz DUPLAGA thanked Dr Nastarak and Dr Soya, but mentioned that there were problems with the sound, especially with Dr Soya in Krakov. Dr Nastarak stated that the sound quality was usually better.

2.4. Questions and answers

Fabio BUCCOLINI of Vox Net R&D in Italy asked about the format of the images and the kind of displays that were being used.

Mariusz DUPLAGA replied that they used the standard liquid crystal display (LCD) screens. The secondary sessions did not focus on the diagnostic assessment of the CT scans or X-rays, but simply on assisting people understand what the issues were. The assessment of the radiological images was down to the specialists and they needed to give their input in advance.

Paul DE BREM commented how useful it was for Proszowice to show their images and pinpoint where the areas of interest are. Mariusz DUPLAGA replied that this was the value of the software, so that people could have a common understanding of what the problem was.

Mariusz DUPLAGA explained that the demonstration that had just taken place was a typical situation where the peripheral hospital was no longer able to deal with the case. When Proszowice was at the limit of their diagnostic capabilities, they would share the problem with the University Hospital. About 20 hospitals in the region could access the referential centre to deal with patients who required more diagnostic tools. The sessions were also used as an educational tool for students of medicine.

2.5. Teleconsultation in geriatric care and psychiatry led by CHU Toulouse

Professor Louis LARENG

CHU Toulouse, France

Louis LARENG explained that this demonstration would be a teleconsultation between a geriatric care home in an isolated area in the Pyrenees and the University Hospital in Toulouse.

The teleconsultation session takes place with tests on words, gestures, mimes and pictures.

A PARTICIPANT explained that all the data were reported and the doctor could use this for prescriptions. Every patient would have a kind of credit card containing his or her medical records.

2.6. Teleconsultation application in acute medical care led by cyprus university

Dr Theodoros KYPRIANOU

Nicosia General Hospital/University of Cyprus

Nikki PAPHITOU explained that this demonstration would be a teleconsultation between the Nicosia General Hospital's Intensive Care Unit and Larnaka Hospital, which was a peripheral hospital. A physician was seeking the opinion of a referral physician in Nicosia.

Dr KYPRIANOU set the scene for the teleconsultation for an intensive care case in Larnaka Hospital. He explained that the session would be carried out in Greek, as it was a real session.

The teleconsultation begins. Nikki PAPHITOU explains that a 22-year-old man has been admitted two days ago. The physical signs are unremarkable, except for a sinus tachycardia. The blood count is provided and there are signs of some inflammation. A computerised axial tomography (CAT) scan of the chest has been done and there are some abnormalities in the right and left lungs. Additionally, there has been an abdominal CAT scan and the adrenal gland seems enlarged. There are also some deposits on the vertebrae.

The physician in Larnaka is talking to Nicosia's physician because she wants advice on whether to transfer or not the patient. The physician in Nicosia wonders whether it would be safe to transfer him in view of the patient's abnormal oxygenation. The physician in Larnaka says that they can no longer manage the patient in the small hospital there. The physician in Nicosia advises that the patient needs to have a biopsy. The patient is also suffering from a fever because of his injuries but they are not yet able to reach a conclusion on that. The problem is complex. The physician in Nicosia agrees on the transfer as further investigation is required and Larnaka lacks some facilities, with no neurosurgeon, for example. It is agreed that the anaesthetist will accompany the patient in the ambulance.

Dr KYPRIANOU advised that they were trying to establish this kind of service on a regular basis between Larnaka and Nicosia and there had already been a request for funding to continue the pilot after the completion of the Healthware project. The funding request had to gone to the Government and the Cyprus telecommunication authority, which were very interested in investing in these kinds of technologies.

Paul DE BREM commented that it was interesting to see that people in Larnaka and Nicosia were able to view the same images and work on those images separately.

Dr KYPRIANOU replied that it was very useful because it allowed people to mark the pictures and save them with changes. That meant that you could prove that the important aspects were pointed out during the teleconsultation, which was a very useful ting for legal purposes as well.

Paul DE BREM thanked everyone in Nicosia and Larnaka.

2.7. Conclusions of the morning sessions

Paul DE BREM commented that some of the projects seemed still to be somewhat fragile, especially in terms of finance. In the afternoon, there would be an opportunity to look at some mature telehealth systems and the very practical question of "how it was possible to achieve sustainable telemedicine services in Europe".

3. SESSION 3: BEST PRACTICES AND SUCCESS STORIES FROM EUROPE

3.1. Medicin@Pais, telemedicine and regional planning

Professor Marc RAUCOULES

Head of Anaesthesiology, CHU Nice, France

3.1.1. THE HEALTHCARE CONTEXT OF THE ALPES-MARITIMES REGION

Marc RAUCOULES stated that his interest in telemedicine was in the area of continuous medical education. The population in the Alpes-Maritime department was not equally distributed between the coast and the mountains, where the coast had 80% of the population but only 10% of the land. There was in fact depopulation occurring in the isolated mountain areas, which was increasing year on year. To try to stem this, the local authorities had a number of options available. There was the improvement of the road infrastructure, but this was not sufficient. In fact, when roads were improved, the population movement from isolated areas to the big cities increased. The social and economic environment of villages also changed. The authorities therefore decided to develop new ways of accessing information, including the use of telemedicine.

There were few general practitioners in the mountain areas and their average age was over 50. However, 721 medical beds were available. This was a very active area, therefore, and many jobs existed because of the health sector. People wanted a good quality of care, to receive that care within their own communities and the provision of medical resources and services. Additionally, old people wanted to stay at home.

3.1.2. THE PROGRAMME

3.1.2.1. Main focus

The telemedicine programme came up because of new information technologies and strong political willpower, with funding from the General Council, the Leader Plus programme in Europe and the Health Ministry.

The aim of the programme was to bring the best allocation of medical resources and have a good health network, improve social cohesion and the quality of life in isolated areas, promote new technologies and get the best value out of existing technologies.

Satellites were used because they permitted a large number of isolated areas to be covered and the multicast technology was particularly suitable for continuous medical education. All valleys in the region were now equipped with telemedicine devices. There was some expertise on the coast at the University Hospital of Nice, as well as in a hospital in the mountains.

3.1.2.2. Key areas

Practically, the aim of the programme was to maintain and recruit general practitioners, strengthen the role of rural hospitals, help keep old people in their homes and improve service delivery to the population. It was also important to support employment.

It was important to tackle isolation and programmes for continuous medical education and the training of nurses were developed. There was also training for doctors and help was given on the assessment of care through evaluation, diagnosis and rehabilitation. General practice was integrated into the healthcare network, particularly in gerontology, and assistance was given to coordinate doctors in rural hospitals. Additionally, the programme helped with the certification of hospitals.

In terms of caring for old people at home, training, counselling and follow up for the family was very important. There was also training of auxiliaries and a programme to detect early memory disorders, as well as an effort to develop a prevention programme using video transmission.

Another aspect of telemedicine was training leading to a certificate, with 20 students receiving their national diplomas as child care assistants in 2007. Every student then found work in the villages. The satellite devices were used to evaluate students and interactivity was considered to be good. Results of students who undertook remote learning were better than those for students at Nice and the physical absence of the trainer was not a problem.

Telemedicine allowed a medical follow up and was used to support patients returning to country areas for convalescence. Services were also developed with the general population in the villages and information was made available in the rural hospitals. The programme also provided the chance to study for a diploma and there was also teleconsultation in psychiatry and dermatology.

The ultimate aim would be to provide people in rural areas with the same amenities that were available in the cities. This would be both a medical and social offer, as well as possibly covering culture, education and training through telemedicine, which the interoperability of the different technologies already made possible.

3.1.2.3. Technical aspects

The satellite technology gave high-quality images, was easy to use and reliable, and provided guaranteed high-speed connections. The support provided by Thales Alenia Space was very good.

The strong points of the programme were the colorance of the project, the responses of the population evaluated customaries, and the chance to support and reinforce economic activity and improve quality of life. Satellite technology was very effective in delivering that.

3.2. Demonstration of DICOM technology

Pascal LOCHELONGUE

Healthware Project Coordinator, Thales Alenia Space

Paul DE BREM commented that the MEDICINA-PAIS network used Digital Imaging and Communications in Medicine (DICOM), a specific image standard that was particularly well adapted to medical images.

Pascal LOCHELONGUE then introduced a demonstration of DICOM technology. He described a scene were someone had an accident and was being transported to a rural hospital that did not have all the necessary expertise to manage the victim.

The connection is then made via satellite with the expert at the university hospital and diagnostics are attempted. The patient is suffering from abdominal injuries and Pascal Lochelongue asks if the staff there had the possibility to do a radiography. At the hospital, Tarek replies that he can send to Pascal radiography so that he can make a diagnosis. Both sites share the same DICOM pictures. A telepointer is used to help clarify what is being talked about. Any part of the picture can be magnified as well as zoomed and scrolled. The remote site can also control the application and process the pictures.

The first examination is completed, but this is not sufficient for Pascal to make a diagnosis. He requests an ultrasound test, which is prepared and sent. The application includes a video-streaming module that allows real-time transmission. The ultrasound test is then received, with the speed of 300-400 kilobits per second giving very good quality images.

Once again, Pascal does not have sufficient information and asks for CT scans. Tarek then prepares a CT scan. Pascal takes control of the application and can modify the pictures. He locates the duodenum and using the magnifying glass identifies some air bubbles. This gives him a better idea of the patient’s condition and further measurements are taken. Pascal can now make his diagnosis and requests the patient to be transferred to the operating room. He will also be able to follow the operation remotely thanks to real time video transmission of the surgery. The technology provides the opportunity for people to work together, with much more advanced contents and more powerful tools. During the videoconference consultation, it is also possible to call another expert on the phone (VoIP phone call directly from the software interface) to participate in the discussion.

More broadly, one of the objectives was to continue improving the Healthware platform by integrating tools such as DICOM. It had not yet been able to integrate all the tools that were needed for telemedicine, but DICOM was something that was being considered as a next step.

3.3. French Guiana telemedicine network (CNES cooperation network): network features and operational scheme

Dr Erwan FONTAINE

CH Cayenne, French Guiana

3.3.1. FRENCH GUIANA’S HEALTH PROVISION

Erwan FONTAINE explained that French Guiana was a department about the size of Portugal, with more than 200,000 inhabitants, who were very unevenly distributed, with 80% residing on the coast. For those living inland, there were 21 health centres, which could only be reached by water or helicopter. Some were large health centres, but others might just have one nurse or even someone with no medical knowledge. There were not enough specialists available to spread around the different locations.

3.3.2. THE EXPERIENCE OF FRENCH GUIANA

The telemedicine network started operating in October 2000 with communication between two centres only, under an agreement between the Centre National d'Etudes Spatiales (CNES) and Cayenne Hospital. There was then an experimental phase of six months after which technical, medical and economic evaluations were made. Four sites were chosen on the river on the border with Surinam, with two other sites on the river on the border with Brazil. The areas of cardiology, dermatology and parasitology were also chosen. The project was found to be reliable and relevant and was therefore continued.

The telemedicine portable station (TPS) comprises a laptop PC, digital camera, a digital ECG recorder and an adaptable microscope on the camera. Technical evaluation looked at the capability of the equipment to withstand the equatorial climate. The economics of the system were also analysed, so that all health professionals could access it. The economic evaluation was the most difficult one to do. Nevertheless, a study over 17 months has shown that the system allowed 22 sanitary requirements to be avoided, giving a saving of more than EUR80,000. It also meant that in 20% of cases children did not have to be transferred from their village to the city. The medical evaluation has shown that the difference was only 3.5% after a double reading of power pathology blades.

3.3.3. THE EXTENSION OF THE TELEMEDICINE NETWORK

The network was first extended in terms of medical specialities, bringing in ophthalmology, gynaecology, obstetrics, paediatrics, imaging for neurosurgery, gerontology, dermatology and traumatology.

The second programme was at the geographical level, with 16 of the 21 health centres being equipped with the system. Three centres now had a portable echograph and a fourth centre had a slit lamp for tele-ophthalmology. Two hospitals were equipped with the system, like the country's prison so that prisoners did not always have to leave jail for treatment. There was also a network connection to Martinique's emergency medical service so that patients could be transferred for specialist neurosurgery.

The network operated by the information going from the health centre to the satellite. From the satellite it moved on to a server in Toulouse and then to Cayenne via the Internet.

There were four types of communication. The most isolated centres had satellite telephone. There was also satellite dish and one centre had Asynchronous Digital Subscriber Line (ADSL). The rest had an analogue telephone network.

As regards medical specialities, initially most of the activity focused on dermatology and parasitology; currently, there was less parasitology, but there was a lot of imaging, and dermatology was still very important. A good example of this was where a child was kept at the local centre and given antibiotics. Photographs were then sent and advice was given.

3.3.4. FUNDING

For the initial first two years, funding amounted to about EUR225,000, provided by CNES, the hospital and Europe. In the extension period of four years, about EUR800,00 was provided. The portable telemedical station cost about EUR10-15,000, with the price of a teleconsultation estimated at about EUR78, of which EUR53 related to communications tools.

3.3.5. FUTURE PROJECTS

Teleobstetrics would be developed with the teleweb and the number of portable echographs would be increased. There would be projects in cooperation with CNES and the European Space Agency (ESA) to perform echography in real time. There would also be an extension of the network to general practitioners on the coast. Additionally, it had only recently been decided to have a disaster medicine programme, which would be done in cooperation with Thales Alenia Space and CNES.

3.3.6. CONCLUSION

Like telemedicine in general, telemedicine in French Guiana was of indisputable medical interest. It was totally justified in isolated locations. Maintenance was a key area and the contribution it made to patients and health professionals was confirmed every day. However, investment and operational costs were not negligible and it was important to remember that it was an operator-dependent tool. Doctors had to want to use it.

3.4. Questions and answers

A PARTICIPANT asked what the other costs of the teleconsultation were for, apart from the telecommunication cost of EUR53. Erwan FONTAINE explained that the rest of the cost related to maintenance and upgrades. Doctors were not paid.

A PARTICIPANT wondered why Inmarsat was being used, as this was more suitable for mobile requirements, not fixed sites. Erwan FONTAINE explained that while the health centres were fixed sites, there was often a need to go to patients when they were unable to be moved.

A PARTICIPANT recognised that, as a doctor in French Guiana, Erwan Fontaine would believe telemedicine to be very useful, but wondered if he would think the same way if he was located in the centre of Paris. Erwan FONTAINE accepted that telemedicine worked best for isolated situations, but even in Paris patients could benefit. Patients really should not necessarily have to go to the doctor for blood pressure tests, for example.

Yoani MATSAKIS stated that telemedicine was not used in exactly the same way in Paris, but the city nevertheless had a long experience of it. In Paris, the need was for permanent access to medical expertise and as it was not possible to have the required personnel in all 35 hospitals, a telemedicine system had been set up, with a team that comprised different people every day.

3.5. Discussion with Thales Alenia Space engineer in French Guiana

Pascal LOCHELONGUE stated that satellite equipment had been sent to Cayenne recently in the form of an emergency container that could be deployed in the field very quickly to provide support to local teams. This included a portable telemedicine workstation similar to the one that was demonstrated earlier by REMIFOR in the VSAT truck. An engineer was currently in French Guiana to train local staff to the use of the system.

Pascal contacts the engineer, who explains that they have delivered the first emergency container to Cayenne Hospital. The staffs, ranging from doctors to ambulance drivers, are currently being trained. The container is equipped with medical equipment, including echograph equipment and blood analysers, as well as a telemedicine suitcase.

4. SESSION - HOW TO ACHIEVE SUSTAINABLE TELEMEDICINE SERVICES IN EUROPE

4.1. Standardisation in E-health and telemedicine

Saad MEZZOUR

RF Regulatory Manger Europe, Medtronic and Member of the European Telecommunications Standards Institute (ETSI)

4.1.1. BACKGROUND

Saad MEZZOUR explained that Medtronic was a large manufacturer of implants, pacemakers and defibrillators. He explained that his background was as an engineer and not medical. The European Commission was funding a project across the three standardisation organisations in Europe to develop standards for e-health including telemedicine.

ETSI dealt with information and communication technology standards. It was located in Sophia Antipolis and had over 680 members. Global System for Mobile Communications (GSM) and 3G were two of the major standards that ETSI helped develop and ETSI was recognised by both the European Union and the European Free Trade Area (EFTA) as being the standards institute for the telecommunications industry. It was also recognised globally, as most of the standards developed in Europe were also used outside Europe.

In total, there were a large number of standardisation organisations in the world, all of which were coordinated under the International Telecommunication Union (ITU). Europe had three standardisation organisations: the European Committee for Standardisation (CEN), CENELEC and ETSI. Industry and stakeholders could participate directly in ETSI and all 27 member states of the European Union participated in CEN. Industry could not participate in CEN or CENELEC, but was represented through national standardisation organisations. ISO and IEC were the most well-known standards.

CEN focused on general electrical issues in terms of safety, security and privacy; CENELEC was more about high power electrical issues, including safety; while ETSI focused on information and communication technologies.

4.1.2. THE NEED FOR STANDARDS

The more technology and complexity there was, the more standards were needed, and these needed to be introduced in the early stages, not when all the technology had been developed. In information and communication technologies, there was a range of different sectors involved, with different regulatory environments, all of which needed to be brought together to develop the necessary requirements and standards.

E-health brought many challenges and there were a lot of different technologies already being used in the area. For example, data security was very important and the human factor was also crucial. Elderly people, for example, often did not understand the new technologies and it was therefore imperative not to confuse people with technological details. ETSI was already doing a lot of work on emergency communications and the human factor was again important there, in terms of dealing with the elderly, the blind, the deaf and those who could not read or write and so on.

The European Commission had identified telemedicine as a first step and it had been included in the e-Health Communication Action Plan. This covered the small devices for monitoring patients' vital signs, as well as biomedical informatics and health treatment. After telemedicine, the long-term aim would be to progress to nanotechnologies and so on.

The Commission had issued a European mandate to CEN, CENELEC and ETSI that applied to all the information and communication technology domains of e-health, including telemedicine.

4.1.3. THE WORK OF ETSI

ETSI started its work by looking at Europe and addressing the relevant issues. The experience of the US in e-health had also been examined and ETSI worked on a worldwide basis with Intel. Additionally, there was very close collaboration with other bodies. ETSI also worked closely with emerging countries, where there were very some clever uses of satellite technologies for telemedicine, such as a boat that sailed along the Amazon River, which was equipped with all the kinds of facilities that would normally be found in a hospital. India had a similar example using a train that brought telemedicine to isolated regions.

The first output of ETSI was a special report that detailed all the available standards for e-health. The health security and safety of the patient was extremely important. Patient data was critical and it was crucial not to reveal faces and names. Interoperability was another key issue and the Commission was very eager to ensure that all technologies used in e-health were interoperable. The European Health Insurance Card and emergency communications were two notable areas.

As well as looking at areas such as care for the elderly and the type of project in French Guiana, ETSI was also interested in the area of wellness. A technical report was being developed and three work areas had been identified. Firstly, there was the collection of architecture and service models, where key issues of data storage would be addressed, and the data protection model was also extremely important. Secondly, there was the mapping of cases and the telecom service for e-health. Thirdly, there was the frequency bandwidth that was used for radio communications. In this regard, Bluetooth was being considered and reliability was of prime importance, both for the car givers and the Government.

4.2. Financing sustainable telemedicine services: investment and cooperation through public private partnerships

Iain HUNTER

Scottish Centre for Telehealth

4.2.1. BACKGROUND

Iain HUNTER explained that about five years ago the Scottish Executive funded about 10 or 12 telemedicine projects, some of which were successful and others not so much. As a result, the Scottish Centre for Telehealth was established, which acted as an advisory body to the National Health Service in Scotland. However, it was not a funding body.

In Scotland, there was a concentration of population in the central belt and a much more sparse population in the north where the road system was very poor. Air transport or boats were required to move patients. Scotland therefore suffered from many of the same problems as French Guiana. Additionally, there was a lot of deprivation in the Glasgow area where life expectancy was amongst the worst in Europe. Scotland now had a devolved Government that took the decisions on health, and 14 regional health boards delivered healthcare across the acute primary care and mental health areas. On top of that, there were 32 local authorities who dealt with social work and housing. It was therefore a complex structure.

4.2.2. HEALTHCARE STRATEGY

The healthcare strategy in Scotland could be summarised as ‘to help people sustain and improve their health, especially in disadvantaged communities, ensuring better global and faster access to care’. Accordingly, the Scottish Centre for Telehealth had been given the task to take telemedicine into the arenas of unscheduled care, long-term conditions management, the remote and rural setting, and education. Key drivers were an aging population, chronic disease management, green policies, staff shortages and the access and distribution of specialty resources.

There had been a number of renegotiations of contracts for general practitioners, clinicians, consultants and nurses, with the result that resources were becoming more and more expensive. For example, the salaries of general practitioners had gone up by 60% in the last three years and there were also big problems with out-of-hours services.

4.2.3. THE TELEHEALTH BOOTH

4.2.3.1. Working with CISCO

The vision of the Scottish Centre for Telehealth was a telehealth booth, which could be put into a remote rural setting where people could access the expertise that any situation demanded. It turned out that Cisco had been thinking along the same lines and there was also the idea that the booth could be used in a city environment. Cisco and the Scottish Centre for Telehealth therefore worked together and the proof of concept stage had currently been reached, with a booth being installed in an Accident and Emergency (A&E) unit in Aberdeen.

The booth used state-of-the-art video and audio, and medical information from devices. Cisco had been quite insistent on pushing their technology and this was a problem because it required so much bandwidth. Therefore, as well as looking at things from a medical point of view, the pilot project also needed to look at the technology and consider how it would possibly work. Cisco also had pilot projects in the US and they saw the booth as a facility that could be used by large organisations, where it would prevent days to be lost through people taking time off to see the doctor.

4.2.3.2. Use of booth

In terms of how the booth worked, patients would go into the booth and be assessed and diagnosed. Following that, they would then be seen face to face by the doctor. The patients were very happy with the booth and from the clinician's point of view, no diagnosis had so far been changed. Although it was still early in the process, it appeared that everything was quite positive. However, there was also the question of cost.

After the A&E setting, the next thing would be to take the booth to the community setting and see how it worked there. One of the issues was to see if the booth could be a mobile facility and people were asking about the use of satellite technology. Doctors were likely to give blunt feedback and Cisco had been good to reacting to that. After taking the booth out into the community, the aim would then be to try it in a truly rural location.

4.2.4. THE TELEHEALTH STRATEGY

4.2.4.1. Influencing government

The Scottish Centre for Telehealth had a whole range of small pilot projects and the key was to see how they could be mainstreamed across the whole of Scotland. Health boards in Scotland were quite autonomous and it was essential to get the maximum benefit out of the pilots, and the Centre was working hard to try to influence the Scottish Government to consider telemedicine.

4.2.4.2. The business model

The business model was also important. The current Government was extremely opposed to private finance initiatives, although it appeared to feel comfortable about what were called 'strategic partnerships', which was a difficult distinction to understand. However, the days of large private finance initiative deals stretching over 30 years appeared likely to be a thing of the past.

Additionally, a lot of funding was currently in the acute area, with pressure to put patients into the community setting, and it was difficult to move money around. However, telemedicine could be taken a stage further through telemonitoring, which was, in many ways, the role of social work. The whole structure of finance therefore needed to be examined.

4.2.4.3. Technology

In terms of technology and infrastructure, the requirement was for something that was easy to use and had the right support. That did not exist in Scotland at present as the technology was unreliable. Confidentiality and security were also important issues, as there had been a number of recent problems with personal details going missing within the public sector in the UK.

In Scotland, telehealth was seen as being peripheral and the main thrust of e-health currently was in electronic health records. However, it was crucial that telemedicine was mainstreamed within e-health.

4.2.5. CONCLUSION

The cooperation with Cisco had probably been a win-win situation, although it was too early to say for sure. Cisco had provided the Scottish Centre for Telehealth with access to a pool of expertise and had turned the Scottish Centre for Telehealth's idea into a reality.

4.3. Impulse statement: opportunities and blockers for sustainable telemedicine: lessons learned from the Healthware project

Hélène MIGNOT

C2 Team, Healthware Project

4.3.1. INDUSTRIAL RECOMMENDATIONS

4.3.1.1. Healthware successes

Hélène MIGNOT explained that C2 Team had been working with users throughout the project within the framework of User and Citizens Open Group.

As regards the industrial recommendations, there had been some great successes in security. The high level of security that is applicable to medical and personal data is an extremely important issue and confidentiality, authentication, integrity and security of data were also very important. Satellite technology was seen to be good for securing these requirements.

Interoperability was crucial and substantial steps could be taken in ensuring interoperability between the different networks and service platforms, as well as between heterogeneous networks and applications at the transnational scale. In this area, only satellite technology demonstrated efficiency and reliability.

Satellite technology also demonstrated a lot of added value in Healthware in terms of the connectivity it could provide to isolated areas. Very often this was the only way of connecting islands, mountain areas or places with very low populations spread over large areas.

4.3.1.2. Key user feedback

Users felt that autonomy should be increased and that there should be enhanced conviviality, so as to provide them with a real turnkey solution. Technical teams were present at the sessions and users would not actually use the system on their own. The ideal therefore would be a plug and play system, without the need for people to bother about all the technical issues.

The stability and robustness of the system was also important and users' trust was crucial for the development of an advanced telemedicine system.

There was some very precise feedback on functionalities that could be integrated into the system. Some progress was being made on DICOM image processing and the dynamic pages and PowerPoint displays for teletraining were also seen to be very important. These small additions could lead to further success in the development of systems.

4.3.1.3. Change management issues

Technology could be trusted to make progress in the future, but accompanying measures were required beyond the purely technological challenges. The main point raised by users was support and that went back to the point on confidentiality and trust. Training was also required, including specific training for medical people and the technical teams, looking at issues of integration into other technologies.

Maintenance and troubleshooting was seen to be another very important area and there was also the issue of proximity. Isolated places became even more isolated when there was a failure in the system because the expertise was not there to fix things.

The key point in terms of change management was the legal framework. Many risks were generated by the introduction of new technologies, especially in the medical domain, and people needed to be very careful. Legal aspects therefore needed to be covered within the framework of service level agreements, between the service provider, the technology provider and the end user. The extent of each side's liability needed to be defined so that people could have secure relationships and put their trust in the system. Transparency was therefore very important and everything needed to be clearly established in advance.

The security and confidentiality of data also had to be guaranteed by the service provider, as well as questions of liability. Generally, the doctor had an obligation to check that the tools he used were in good condition and that also applied to high tech tools, although the problem was that the doctor would not always know that something was not working. The contract was therefore a good first point to define things of that type. Insurance was also important for doctors and intellectual and industrial property rights also needed to be clearly defined.

4.3.1.4. Technical recommendations

For technical reliability and autonomy, the best way would be to have the Internet model of plug and play, where people would have a very stable system and not need to think about all the potential problems there were. It was also important to work closely with users so they had what they needed for each medical speciality. The second issue raised was good service delivery and an effective network of local partners. Legal security was a third issue. Physicians were medical experts, not lawyers, and they were not interested in having to deal with legal issues. Finally, affordability was key.

4.3.1.5. Costs

As regards costs, there were number of initial costs that, of course, could not be avoided. However, efforts were being made to reduce maintenance and equipment costs, and over time prices tended to come down. As well as initial costs there were also recurring costs and bandwidth availability was also an issue, which was key to sustainability. Satellite medicine must be available 24 hours a day.

4.3.2. INSTITUTIONAL RECOMMENDATIONS

4.3.2.1. Key issues

In terms of institutional recommendations, it had been found that there was significant fragmentation of the economic structures, with each country having its own economic model and health and social security systems. There was also significant heterogeneity in medical cultures and specialities and it was difficult to keep track of the large diversity of information systems and the various applications.

Legal security was also an issue here, not only in terms of doctors and service providers, but also of patients and citizens, in terms of information held and consents being given. There was a large diversity of priorities and initiatives and a lack of sharing of experience of projects, as well as a lack of integration or any significant type of vertical cooperation.

4.3.2.2. The legal framework

The legal framework remained totally unsuitable for the development of telemedicine, and institutions at both the European and national levels must become involved and make proposals for global action on areas such as the protection of data, confidentiality, patient information and consent, and standards and norms. People must also be able to evaluate the quality of the services that were being proposed. The implementation of a full monitoring system relying on advanced information and communications technologies (ICT)-based management would help significantly by leading naturally to the recognition, characterisation and reimbursement of the telemedical Act and help implement the Personal Electronic Health Record.

4.3.2.3. Standardisation

Standardisation was also key for boosting the sustainability of telemedicine. Importantly, this would help boost the market and it would also be of benefit to small companies, as well as large, that worked on different medical specialities. Knowing that there was interoperability would make it worthwhile investing in research and development and would help big and small firms to work together.

4.3.2.4. Facilitating change

Making the necessary changes was logical, but unfortunately it was not being done and there was a lack of any significant common policy at European level, which would boost all the other legal and normalisation aspects. If a common policy existed, European policies would then need to be turned into concrete national strategies.

4.3.2.5. Obstacles

The main obstacle related to the emergency use. People could not afford to pay for the full amount of satellite bandwidth that was required and have it available 24 hours a day. The only way forward was to mutualise use of bandwidth and a possible solution was to create an agency that would bring together everybody who was interested in using satellite for emergency medicine or even telemedicine generally. This agency could negotiate preferential tariffs and through an automated resource management system would allocate bandwidth as required. This would therefore ensure a continuous and guaranteed availability for emergency sessions, as well as the required affordability. Overall, it offered a very good opportunity to mutualise best practice and end users' requirements and it could possibly be extended to other public service and research areas.

4.3.3. SUMMARY

In summary, what was required was support on affordability, legal security, and interoperability, supported by standardisation and norms, and the user-based development of applications. This would then allow good European coordination.

4.4. ROUND TABLE: how to design and finance sustainable satellite-based and terrestrial telemedicine services

4.4.1. THE PROPOSAL TO CREATE AN AGENCY

Paul DE BREM initiated the discussion by asking what people thought of Hélène Mignot's proposal for the creation of an agency. Iain HUNTER stated that the problem in Scotland was that they were competing all the time. Video would therefore come off badly, when up against other systems. However, the proposal sounded good.

Stephan SCHUG, of EHTEL, thought that the proposal was very interesting, although he was not sure that service providers would be attracted by it because it would mean creating a buying power. There was also competition with terrestrial Internet and it would be difficult to see why anyone would invest resources in establishing infrastructures for emergency services and then find that the services could not be used because of bandwidth problem. It would therefore be worth supporting establishing an agency like this. It was also important to integrate terrestrial and satellite services. Hélène MIGNOT explained that the agency would not take away the role of the service provider but would in fact boost the market and allow service providers to concentrate on the user. Service providers did not make a lot of money on the provision of bandwidth and this offered the opportunity for them to promote and integrate other technologies and networks.

4.4.2. THE FUNDING OF TELEHEALTH

Marc RAUCOULES stated that there were no funds for paying for the telemedicine Act.

Louis LARENG believed that there were two obstacles to telemedicine: who was responsible and who was providing the funding. Once those two problems were resolved, there could be real expansion in the area. Medical responsibility was shared between the clinician in the remote location and the person on site and, while there was no law, it needed to be enforced. In his case, he had an agreement with the social security fund and he was being asked to find a solution. The system that he proposed was that clinicians should receive more credits for being in isolated areas and for spending more time on telemedicine, and that the more credits they received, the more they would be paid. This solution could be used for all telemedicine practitioners. This system of payment had been used for two years in his region and everybody had been satisfied with it.

A PARTICIPANT suggested that the state should pay, although the situation varied in Europe, with a huge regionalisation of the healthcare system. He posed the question how it would be possible to have a European healthcare system that enabled small and medium-sized enterprises to provide services in a market that would probably focus on one customer only – the state.

Stephan SCHUG replied that he believed that it was necessary to differentiate between the various health systems. However, there were already examples of reimbursement within the social security system. There was a very high level of chronic disease coming through currently and telemedicine would be needed to deal with that, and it would therefore be logical to invest in it. Germany already had legislation in place where special budgets were used for cases of that sort. There was also an opportunity for public private partnerships and transaction fees already existed in the area of electronic health cards. Models for sustainability therefore already existed in Europe and these needed to be more systematised.

4.4.3. STANDARDS AND QUALITY

Narasimha-Moorthy SHASTRY noted that there were no standard interfaces or proper hybrid systems in place yet, with rules being made as the project progressed. Those were also obstacles. Unless the European Commission helped partners to know what the rules were, it would continue to be difficult for people to understand how to work together. He tended to disagree with Hélène Mignot in that he believed that people had tried hard to have a good exchange of information.

Pierre RUMEAU agreed with Narasimha-Moorthy SHASTRY that there was a problem of standards in software and, more than that, a problem in knowing what kind of software was needed for different medical practices. Narasimha-Moorthy SHASTRY in turn agreed with the point made by Pierre Rumeau and underlined the importance of adding value to what was already there rather than reinventing software. Pierre RUMEAU referred to differing priorities. For some software, the biggest priority would be image; for other software, it would be data transmission. It was therefore difficult to combine the two systems. Narasimha-Moorthy SHASTRY disagreed. The point of care delivery was what was important. At the remote site, all the person was doing was offering an opinion and it was an accepted legal point that the person offering an opinion was not legally responsible. The person who actually delivered the care to the patient was responsible and it was their considered decision that had to be taken into account. Therefore, an image, accompanied by the notes, would be good enough. This was an indicative image – if a proper diagnosis from an image was needed, none of these tools would work.

Pascal LOCHELONGUE agreed with both Mr Shastry and Mr Rumeau. The software needed depended on the type of usage required. The collaborative software would not be sufficient for radiologists, for example, and there were some much more advanced tools for managing DICOM. It would be necessary to have a fully integrated platform to be able to move on, but the critical mass had not yet been reached for that.

Hélène MIGNOT stressed that it was important to keep the focus on the needs of the users, and both large and small companies had to bear that in mind. In that way, innovative solutions could come forward.

4.4.4. CONCLUSION

In conclusion, Paul DE BREM summarised that there had been some outstanding demonstrations and DICOM in particular was very impressive. Thanks were due to all the participants and the organisers. The Healthware project was about to end, but telemedicine was just beginning.

5. CLOSING REMARKS

Pascal LOCHELONGUE

Healthware Coordinator, Cannes, France

Pascal LOCHELONGUE stated that everyone at the symposium seemed to be 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 people like Professor Lareng, who was doing a lot to try to overcome the two or three barriers that were continuing to block its development. There was already a proposal on payment and a law existed, giving telemedicine a legal framework. Some important steps had therefore already been taken. New actions were in the pipe and the hope would be that over the next two years or so there would be further progress.

The demonstrations today had shown that people were already able to manage systems where they dealt with patients or communicated with other specialists, and when the two obstacles had been removed, it would be possible to switch to a more personal phase of telemedicine. Its own preference would be to move on quickly, although the obstacles were a significant blockage. However, he was confident about telemedicine's future development.

Satellite technology was one specific part of telemedicine and it seemed that the capabilities of DVB-RCS had been demonstrated effectively. 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. The next objective was concerned with usage and he believed that it would be successfully tackled in the next two years.

A PARTICIPANT commented that, at EHTEL, they had been working on e-health for about 10 years and it was striking how today had shown that there was so much experience in the field. This was the bottom-up approach. However, the blockers were not at the bottom level, but the top. These were regulation and finance. It was now time to reconcile the bottom-up approach and the top-down approach and ensure that all the expertise that had been developed at the bottom level was recognised at the top, so that the top level could include it in a global strategy that enabled a mass market to develop.

Saad MEZZOUR echoed that. The term 'telemedicine' tended to be associated with satellite communications and the two should not be confused. For that reason, the European Commission preferred to refer to 'e-health'. Telemedicine was more about end-to-end use and one caregiver communicating with another caregiver and was therefore more about use by medical professionals. To be involved in the mass-market area, it would be necessary to concentrate more on wellness and the consumer market. In fact, people who cared about wellness did not seem to be concerned about security and confidentiality, and the legal framework. In the examples that had been described today, such as people in isolated areas, security was 100% guaranteed because all the stakeholders knew about security. What was needed was for everybody to use the same specifications.

Pascal LOCHELONGUE concluded the symposium by thanking all the organisers and participants.

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